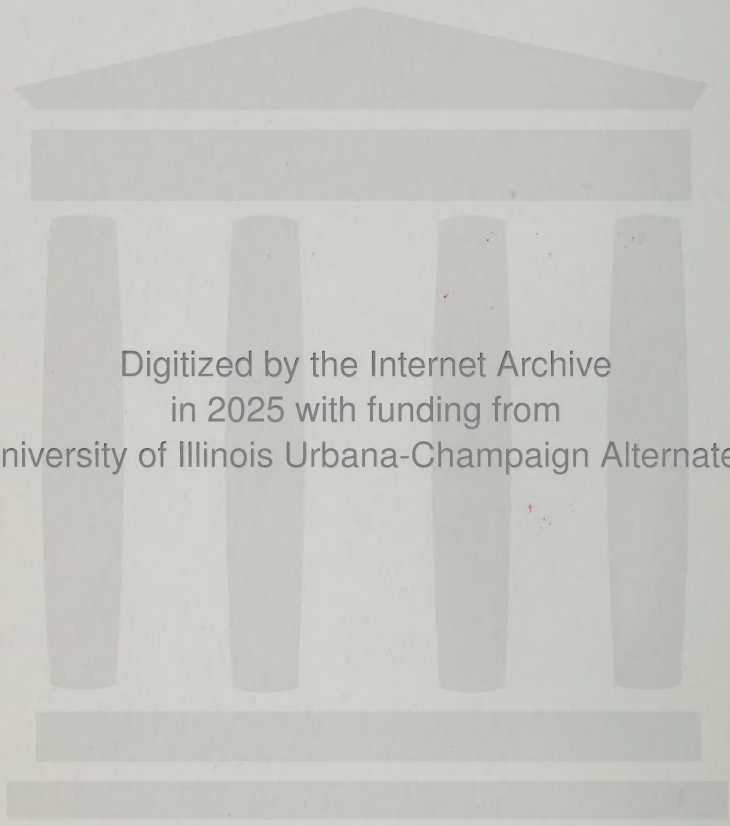
Contributions to
Western Botany



Digitized by the Internet Archive
in 2025 with funding from
University of Illinois Urbana-Champaign Alternates

https://archive.org/details/contributionstow1318unse

Return this book on or before the
Latest Date stamped below.

University of Illinois Library

APR 4 1962
FEB 22 1978
MAY 07 1982
DEC 07 1989
NOV 28 1989
MAY 23 2001
AUG 23 2005

JUN 22 1961

L161—H41

581.979
J72c
no.13

CONTRIBUTIONS

to

WESTERN BOTANY,

NO. 13.

by

Marcus E. Jones, A. M.

Issued Jan. 20 1910.

JUL 19 1965

581.979
J72c
no. 13-18
Biology

CONTRIBUTIONS

to

WESTERN BOTANY,

No. 13

NEW SPECIES AND NOTES.

Cheilanthes gracillima var. **aberrans** Jones is a form of C. Fendleri with pectinate-toothed scales and approaches C. myriophylla.

Gilia Wrightii. Gr. My No. 5247, from Springdale, Utah, is a low shrub having the appearance of being biennial or short-lived. The heads are subcorymbose or single, and with leaves gradually reduced above to short bracts. The leaves are mostly entire on the upper stems but with short lobes near the root, rarely all entire. Flowers smaller than in the variety described below, about 4″ long, bracts wider, mostly lanceolate, otherwise as in the variety. This also includes my No. 5297n from Pahria Canon Utah, also from LaVerkin Utah and probably the material from Elk Ranch on the upper Virgin river at 7000° alt. This species would seem to belong to the section Elaphocera with oval anthers, but Gilia Gunnisoni, pumila and polycladon belong in Heugilia. Gilia densifolia is closely allied to G. Wrightii though with linear anthers.

Gilia Wrightii var. **pectenisecta.** n. var. This is my No. 10464 from Mack Colorado May 27 1908, growing on shelving rocks among junipers. It is a low shrub, 6-12′ high, tufted with many slender and erect stems 4-12′ high, simple above, minutely woolly, leafy to the top and with a single leaf subtending the mostly solitary and dense head. Leaves all pinnately divided from the base or at least with no lobes arising

above the middle, terminal leaflet the longest, lobes 6″-2′ long, ½-1″ wide, nearly smooth and green, acerose and rigid. The order of lobing is the reverse of that in G congesta where the leaves are lobed above the middle. Bracts and bracteal leaves conspicuously white-woolly with long and pointed flat hairs, the edges of the nearly linear bracts seemingly pectinate because of the dense hairs along the edge, tips of the bracts and calyx lobes green and smooth and acerose. Calyx about 5″ long. Corolla about 6″ long, with widely spreading, entire, obovate, and water-lined lobes 3″ long, white. Some specimens have leaves with lobes 1-3″ long. Stems nearly equably leafy to the tip. My No. 10583 from Grand Junction May 22, 1895, is more condensed and more ashy.

Gilia floccosa var. **ambigua n. var.** Slender, erect, widely branched. Heads small. Flowers blue, 5-6″ long. Anthers narrowly elliptical, exserted. Leaves entire, floccose-woolly mostly throughout. Plants about a foot high. Victor, California May 17 1903, N. 10011, also No. 9917 from Bear Valley, California, July 19, 1900.

Gilia virgata var. **Yageri.** n. var. Plants slender, widely and much branched. Heads small. Flowers blue, 6-9″ long, with broad oval and lined lobes. Anthers broadly linear. Leaves entire or with one or two pairs of lobes at base. This is the desert form. Skull Valley Arizona No. 10250, Palm Spring California No. 10249 Wickenberg Arizona No. 10253, Franconia Arizona No. 9918, Moapa Nevada No. 9919, Hillside Arizona No. 10279, Congress Junction Arizona No. 10251. I regard the types as Nos. 10279 and 10253. Also I refer here No. 9936 from Yucca Arizona May 17 1884, La Verkin Utah No. 5189q and 5194, Springdale Utah No. 51211, Yager's north of Tucson Arizona No. 9935, Rio Tonto Basin Arizona No. 9934.

Gilia arenicola n. sp. Needles California May 3 1884 No. 10447, Kelso California May 2 1906 No. 9955, growing in sand. Also gathered by Mrs. Brandegee in the Mojave region. Section Dactylophyllum. Lower leaves opposite, upper alternate, all about 6″ long, mostly forked above the middle, sometimes 3-lobed near the base, each lobe 1-nerved, and the base 2-3-nerved according to the number of lobes, rigid, acerose, green, ciliate. Internodes short and the whole plant congested, 1-2′ high, with several slender branches which have single and short-pediceled flowers in all the axils but the lowest. Leaves not reduced above, bracteal ones the same. Flowers apparently

vespertine after the fashion of Section Linanthus, cream-colored, very slender corolla mostly shorter than the calyx and rarely a line longer. Calyx in fruit 3″ long, lanceolate-oblong, hyaline except the 5 green ribs which end in rigid and slightly spreading teeth ¾″ long, acerose, smooth, fringed. Stamens slender, not dilated, about as long as the white and narrowly ovate anthers which do not reach the sinuses. Pistil shorter than the stamens: style shorter than the stigmas. Pods elliptical, filling the calyx, many seeded. Seeds oblong, angular, very small, much curved, reticulate-lobulate, with a close coat and without mucilage or spiricles, reniform. Embryo white, strongly curved, in copious albumen. Radicle about twice as long and about as wide as the cotyledons. This appears just intermediate between the two sections Linanthus and Dactylophyllum. I refer to the type also No. 124572 Univ. of California from Waterman, Cal., collected, I suppose, by Mrs. Brandegee.

Gilia campanulata Gray. This evidently belongs to the Dactylophyllum section instead of Eugilia where Gray put it. Pedicels sometimes nearly 1′ long. The species extends south to the Amargosa desert. Its relationship with G. Parryi and demissa is evident. Gilia filiformis also belongs between this and Linanthus and not in Eugalia.

Phlox Douglasii var. **salina** n. var. Whole plant whitish but smooth, bases of leaves mostly with a few hooked prickles or very stiff hairs which are reflexed. Leaves rigid, fleshy, 3-6″ long, ½-1″ wide, with short and sharp prickle, edges a trifle revolute and so the leaf seems 3-nerved, linear or rarely some of them oblong-lanceolate,sometimes minutely roughened when young. Stems densely cespitose and with imbricated leaves. Flowers mostly single and terminal, on short and leafy branches. Calyx linear, 4″ long, cleft to the middle, not at all hyaline except in a narrow line running down between the lobes which are green rigid acerose linear and erect. Corolla 9″ long, with purple throat and white and nearly orbicular lobes 3″ long. Stamens short-oblong. Stamens and style not exserted, style about half as long as the corolla tube. This grows in highly alkaline soil along with Distichlis and Suæda. Cherry Creek Nevada July 13 1891 and June 19 1906, Nos. 10474 and 9982.

In the following borages the writer is not convinced as to whether the genera split from Krynitzkia are valid or not, it is

his opinion that they are not valid. He is equally doubtful as to the validity of the proposed species, but they seem to be good.

Krynitzkia mensana n sp. (Oreocarya). This may be a form of Shockleyi, Cæspitose perennial with many short stems and short and leafy-bracted racemes in a close panicle, 4-6′ high, proper stems very short. The panicle begins at the end of the root leaves. Pubescence very dense on calyx, less so on the leaves, on the stems and inflorescence weakly and finely setose. Bracts 6-9″ long, linear, surpassing the flowers. Corolla white, 3-4″ long, linear, surpassing the flowers. Corolla white, 3-4″ long and equaling the calyx, limb 2-4″ wide. Fruiting calyx broadly ovate, 4″ long with deltoid-triangular lobes not reflexed, with age. Nutlets ovate-oblong, 1½″ long; back much arched and very convex; angles reduced to sharp and wavy lines; dorsal face deeply and sharply rugose in irregular transverse lines and forming pits, slightly tuberculate; ventral face very convex and deeply and bluntly rugose: groove broadly triangular-oblong deeply excavated and occupying about a quarter of the face, and bordered by a thick and white and pectinate ridge which goes to the base of the nutlet. Emery Utah No. 5445p May 16 1894.

Krynitzkia oblata n sp. (Oreocarya). Tufted perennial, 1-1½° high. Leaves oblanceolate, acute, 3-5′ long, on margined petioles longer than the blades, papillate, green, shortly pubescent with some fine and some coarse short and appressed hairs, stems and inflorescence shortly hispid with widely spreading hairs. Inflorescence a narrow thyrsus with short and scorpioid racemes rarely an inch long. Flowers all bracted. Bracts lanceolate, 4-6″ long. Corolla about a quarter longer than the calyx, limb 2″ wide, tube 4-6″ long. Fruiting calyx broadly ovoid, 3-4″ long, lobes triangular, not reflexed nor opening. Nutlets abruptly arched in the middle to 80° (like those of O. suffrutescens), 1″ high, forming an oblate sphere, back barely convex, very tuberculate and somewhat rugose in the middle, shining, angles very sharp and thin with a rudimentary and raised wing, ventral face strongly keeled nearly to the base, where it stops a little short and drops abruptly into the transverse groove, sides concave and minutely tuberculate. No. 3759 El Paso Texas, April 23, 1884. Peach Springs, Arizona, No. 6684, May 26, 1884.

Krynitzkia multicaulis var. **setosa** n var. Pedicels stout

and about ½″ long. Sepals 3″ long. Pubescence never yellow. Setæ about 1″ long and less dense. Nutlets like the type but with a very faint line of scarcely visible tubercles near each margin. Plants 6-8′ high, erect. Calyx explanate. Inflorescence of very short spikes, uniserial, of 3-5 flowers. Corolla very short and small, 2-3″ long, white, 1½″ wide. Near Fort Cove Utah June 27 1901, growing under junipers.

Krynitzkia multicaulis var. **abortiva.** (Greene Pitt. 3 114.). This is a well marked variety abundantly connected with the type by intergrades from New Mexico to Arizona. The peculiar incurving of the nutlets described by Greene is characteristic of the species as well, the "peculiar stipe-like projection" of the ventral side of nutlet does not exist, it is the usual abrupt ending of the ventral keel common in the whole multicaulis group. The keel rises higher as it approaches the base of the nutlet when it drops abruptly into the transverse scar which is set in a deep recess.

Krynitzkia glomerata var. **Virginensis** n. var. Biennial, many-stemmed, erect. Pubescence of leaves very dense and compact, setose hairs very few. Thyrsoidally branched above. Nutlets broadly ovate, obtuse, nearly straight, 1″ long, shiny, sparsely rugose and tuberculate, with raised central ridge somewhat transversely rugose, margin with distinct but narrow wing all around, ventral side rugose and with a raised white edge surrounding the subulate groove which ends in a transverse line a quarter of the way from the base. Pedicels 3-4″ long. This is No. 5195a from La Verkin Utah May 8 1894 at 3500° alt. I would also refer to this No. 5124 from Diamond valley Utah.

Krynitzkia depressa n sp. (Oreocarya). Densely cæspitose perennial. Root leaves many, densely tomentose and appressed strigose, spatulate, 1-2′ long, petioles very broad and as long as the blades. imbricated and long-hairy. Spikes nearly simple, barely surpassing the leaves, and with flowers appearing as if whorled, and on short and stout pedicels ½-1″ long. Calyx broadly ovate, 2″ long, open, with triangular lobes, densely pubescent but not evidently setose. Corolla 2″ long, white, as long as the calyx, limb 2″ wide. Nutlets deltoid-ovate, a little incurved, with sharp edge and obtuse apex, back concave below and slightly keeled above, closely tubercled all over, a few of the tubercles raised but rarely rugose, shining, ventral face very deeply rugose, the deltoid-triangular

scar going to the base and occupying about a third the face, and open. This plant is readily mistaken for K. fulvocanescens but the broad and short calyx and lobes separate it. Aurum Nevada No. 6692, June 20 1893 at 7300° alt. on slopes. Also Muncy Nevada No. 6713, Vermilion Utah June 4, 1901, also Monroe Utah and Marysvale. The latter at 9000° alt.

Krynitzkia fulvocanescens var. **Idahoensis** n. var. Racemes few flowered and loose. Pedicels 2-4″ long. Calyx lobes linear, 4-5″ long, apparently not opening when ripe. Nutlets finely and deeply petinate-rugose but not transversely rugose, dorsal groove not at all bordered by white ridge. Corolla not longer than the calyx. Inflorescence yellow. No. 6474, near Weiser Idaho April 28 1900. These short-flowered forms are so often found alongside of the normal ones that one must assume that there is a genetic connection between them. There are many forms in western Utah and Nevada that approach this form.

Krynitzkia mixta n sp. This may be one of the multitudinous forms of K. barbigera. 1-2° high. Whole plant strigose with slender very long and ascending white hairs. Base of calyx densely white-hairy and shaggy as well as sparsely setose with slender setæ from a small and pustulate base. Plants paniculately branched from the base, annual, erect. Spikes dense and scorpioid in age, the fruits contiguous, spreading. Flowers very narrow, with scarcely any limb, 1½″ long. Fruiting calyx 4-6″long, with ovate base and short and spreading tips closely constricted below, linear, green above. Seeds usually 2, deltoid, with an acuminate tip, shining, 1″ long, coarsely muricate, truncate below, scar deltoid, excavated, groove open to tip, attached half way up, forks of scar as long as the attachment in the groove. Mescal Mts. Arizona May 24 1890. This is the type. I also refer here material from the Needles Cal. May 3 1884. St. George Utah, No. 5106 April 26 1894, Silver Reef Utah May 3 1894, Hackberry Arizona April 25 1903, No. 3832 May 6 1884, Meadow Valley Wash Nevada April 28 1904. One nutlet is apparently firmly attached to the gynobase.

Krynitzkia decipiens n. sp. (Cryptanthe). This seems to be intermediate between dumetorum and angustifolia, and closely approaches intermedia. Slender annual with filiform bractless spikes 3-8′ long in twos or threes. Leaves linear, papillose, 1-2′ long. Flowers not over 1″ long and minute. It has the calyx of K. oxycarya, 1½-2″ long, lobes filiform, green,

spreading at tip, erect, appressed, oblique. Nutlet 1, ovate-lanceolate, incurved, faintly papillose but more evident above, groove open at base, attached nearly to the top, 1″ long, obtuse-angled. Pubescence appressed and short. The type is my material from Yucca Arizona May 14 1884. Other material is from Hackberry Arizona, Darwin Cal., Meadow Valley Wash Nevada.

Plagiobothrys humifusa n. sp. This may be an extreme form of tenellus. Annual, nearly prostrate, softly pubescent throughout. Radical leaves ovate, 6″ long, nearly sessile. Stem leaves the same but sessile, 4-6″ long. Proper stems very many and very short, ending in simple or geminate and slender spikes 3-4′ long, all leafy-bracted and loosely flowered in fruit when the flowers are 6-9″ apart below. Calyx nearly hemispherical, 2″ long, open in fruit, lobes triangular and calyx cleft below the middle. Nutlets cruciform, incurved to a half circle, shining, faintly rugose, sparsely set with sharp papillæ, dorsal ridge evident, angles double and denticulate with sharp papillæ, otherwise as in P. tenellus. Plants 3-6′ long. Chat California 5000° alt. June 18, 1897. The roots secrete the usual purple dye, but the stems and leaves do not.

Lupinus prunophilus n. sp. Habit of L. Burkei. Densely tufted, erect, stout and coarse, 2° high. Lower petioles often a foot long, upper often only an inch long. Stems and leaves sparsely pubescent with spreading hairs. Upper side of leaflets smooth. Leaflets about 7, 2-3′ long, spatulate-oblanceolate, strongly nerved, green. Stems simple. Spikes nearly sessile, very dense, about 6′ long. Flowers purple, 6″ long, very broad, keel not exserted; banner smooth. Calyx short-shaggy, spurred, on a slender and shaggy pedicel 6″ long. Bracts linear-lanceolate, shaggy, 6-8″ long, persistent. Pods about 18″ long, 6″ wide, 5-6-seeded, shortly-appressed-pubescent, fleshy, narrowly oblong, triangular-acute. Seeds 2½″ wide, light-colored. This grows on dry mountain slopes Middle Temperate life zone along with Amelanchier and Prunus demissa.

Astragalus lutosus n. sp. White River Utah next the Colorado line, 5200° alt. May 25 1908. This grows on very poor soil in white shale in the barest places where there is very little soil. Perennial from a thick erect and fleshy root which at an inch or so beneath the surface puts out many slender and scaly stems 1-4′ long. Flowers few, white, in a head which is nearly sessile in the axils. Banner white, 4″ high, arched

abruptly to 45-80° at a place 2″ beyond the calyx teeth, thin, sides reflexed most below and there for 1″ wide, not at all at tip, and so the banner is fiddle shaped; sulcus very deep and V-shaped, little if any narrower at tip or flatter, notch deep. Wings oblong-linear, the blade 3″ long and 1″ wide, arched to 30° in a gentle arc, a trifle wider above and oblique at tip, notched a little on the lower side, rounded at tip, white, and faintly purple-veined below. Keel 2″ long and a line high, very flat, lunate, the triangular tip and base about equal, purple, 1″ shorter than the incurved wings which fold over it. Calyx hyaline, reddish, much laterally compressed, base straight, upper side convex, not oblique below, mouth a trifle contracted and a little oblique notched deeper above. Teeth triangular, ½″ long. Bracts triangular, as long as the short and stout pedicels, 1″ long. Pods much inflated, cross section triangular-reniform to round-reniform, ventral suture intruded and pod sulcate along the suture, the dorsal suture slightly sulcate, pod reddish but not mottled, lying flat on the ground, 1′ long, tip upcurved and acute and base downwardly curved, stipitate. The above is from the material got at Dragon Utah. The specimens got in the type locality have slender stems 2-6′ long, many from the thick and rather woody erect root which is branched below, the stems being underground, but not rooting, except the uppermost node or two which are above ground, forming rather dense mats a few inches wide, with the leaves, stems and pods flat on the ground, the subterranean internodes are straight and ½-1′ long, slender, much as in the allied A. Hookerianus. Stipules large, rigid, spreading, reniform, 1-1½″ long. Aerial stems when present zigzag. Well developed leaves 3′ long, with slender petiole about as long as the rachis. Leaflets about 12 pairs, mostly folded, but when open overlapping each other, touching when folded, oval, 3″ long, obtuse, shortly-petiolulate, thick, smooth above, hoary and densely pubescent below with appressed and very fine hairs attached by the base. Ripe peduncles stout, straight, about 1′ long, with 1-4 pods which are on stout and erect pedicels a line long. Bracts hyaline, triangular, not over 1″ long, persistent, with scattered black hairs (as well as calyx). Pods 1-1½′ long, 6-8″ wide, cross section round or nearly so, much inflated, papery, on a slender stipe not as long as the calyx and not jointed to it, oblong-oval to oval-ovate, obliquely triangular-acute at tip and a little narrowed at base, sulcate about a line

deep ventrally, with ventral suture a trifle intruded, dorsally a little sulcate but without intruded suture. Calyx cylindrical, about 3″ long and 1½″ wide, in flower the subulate teeth are about 1″ long. This blooms very early, soon after the snow leaves, in full fruit on May 25th. This is probably what Miss Eastwood has called A anisus from western Colorado, but the true anisus has never been collected except at Pueblo so far as I know. This species is certainly related to A. aboriginum and Hookerianus.

Astragalus detritalis n sp. Four miles above Theodore Utah on the Colton road, on very barren clayey detrital slopes. Allied to A. simplicifolius. Cæspitose in small mats, perennial, from an erect and tapering taproot which at crown branches into several thick and prostrate stems 1-2′ long which are densely clothed with closely imbricated hyaline nearly smooth and oval stipular scales 3-4″ long, which are acute and prominently 1-nerved and adnate to the petiole. Whole plant ashy with very fine and appressed hairs. Leaves all radical, 2-3′ long, with slender and grooved green petioles and 2 pairs of linear-oblanceolate sessile leaflets near the tip and which are jointed to the rachis and about 9″ long and needle-tipped, some of the lowest leaves have broadly oblanceolate leaflets 3-4″ long. Flowers few, capitate, purple, 7-8″ long, sessile in flower and with stout pedicels ½″ long in fruit, ascending, as is the fruit. Bracts very large, hyaline, green nerved, triangular, 3-4″ long, about as long as calyx in flower, persistent. Calyx tube short-cylindric, 2″ long, 1½″ wide, triangular at base and equally inserted, oblique at tip and much deeper cleft above, the arcuate subulate teeth as long as the tube and the lower ones longer. Banner oblong-oval, emarginate, 4″ long, with sides reflexed ½″ wide in the middle, white spot of several bands a line below the tip, banner arched in a gentle arc from tip to base and erect. Wings narrowly oblong, 1½″ wide, rounded, flat to keel and obtuse, a line shorter than the banner, 1½″ longer than the straight and very obtuse keel which is lunate and boat-shaped and not abruptly erect as is usual. Pods arcuate, 1′ long sessile, flat, 1″ wide, flecked with small brown spots, obliquely acute at tip, 1-celled, manifestly allied to A. simplicifolius but differing in the broad calyx, long pod, and flowers three times as large.

Astragalus Duchesnensis n sp. This may prove to be one of the extreme forms of A. lonchocarpus. Plants with the fili-

form and much branched underground stems of the A. diversifolius group, loosely tufted with mostly a single stem to a branch of the root. Stems mostly flexuous, with internodes 1-2′ long. Whole plant including the pods but not the calyx ashy with short and appressed hairs, but green underneath the pubescence. Stems and peduncles fleshy and sulcate. Plants 1-2° high, racemosely branched from the base at 45° angles. Stipules rigid, hyaline below, adnate, not connate, deltoid, the lower ones 2-3″ long, the upper much shorter and reflexed. Leaves 2-4′ long, of about 3 pairs of fleshy, linear, distant, obtuse, petiolulate leaflets ½-1″ wide and 6-9″ long, the terminal one shorter or absent and represented by the prolonged rachis which is never evidently widened, the petiole 6-9″ long, leaflets of the lowest leaves the widest, uppermost very narrow, drying slowly like its allies. Peduncles stout, axillary, racemosely flowered on the upper half, 3-5′ long, tapering and erect or upwardly curved. Bracts minute, deltoid, persistent. Flowering pedicels very short, ascending, in fruit 1″ long. Flowers set nearly at right angles to the pedicel and horizontal or in fruit pendent but pedicel still ascending. Calyx and pedicels black with appressed hairs. Calyx short-cylindric, 1½″ long and ¾″ wide, reddish, inserted in the middle of the base, with triangular base and oblique mouth much deeper cleft above and with very short and deltoid teeth, not compressed. Flowers red to pink-purple, arched, 4-5″ long. Banner oval, about 3″ long, arched to 90° in gentle arc from the calyx, sides reflexed ½″ wide, most in the middle, a little black-nerved above, emarginate, a trifle longer than the wings, white spot of about 6 broad, white bands, coming within ½″ of the tip and sides, sulcus shallow and very broad. Wings lunate oblanceolate, 1″ wide, a little narrowed above, obtuse, arched about 45°, white, entire, flat to the keel and about 1″ longer. Keel with arched base, tip very broad, incurved more than 90°, about 1″ high, black-purple tipped, 2½″ longer than the calyx. Pods white when young,, pendent, arcuate rather more below, linear-oblanceolate, 18-24″ long, 2-3″ wide above the middle, obcompressed, broadly sulcate ventrally, often with flat cross section or triangular, 1-celled, hairy within, chartaceous, to leathery, a little inflated, apiculate to very acute, contracted below into a pseudo-stipe or nearly sessile, arched ventrally and with the prominent suture projecting, dorsal one impressed, red, often doubly arched like the letter S. Common on the mesas from

13 miles below Theodore Utah to Chepeta Well and White River near the Colorado line at about 5000° alt. Lower Temperate life zone.

Philadelphus argyrocalyx. Wooton. This seems to be the same as P. Mexicanus Schlecht. P. serpyllifolius Gray is only a variety of it. I have material from Hillsboro peak New Mex. and Colonia Juarez Mexico. It is characterized by the pods shorter than the hoary calyx. P. microphyllus has the calyx white when young, and varies considerably, Nelson having made a species out of the Utah forms from my collection.

Cogswellia rigida n. sp. This is a Cymopterus Panamintensis in everything but the fruit, and another very interesting link between these closely related genera. It is very anomalous as is also C. scopulorum which connects the anisatus group with Cogswellia. Densely cæspitose from a thick, branched and woody root covered with old coarse and ribbed leaf-sheaths, acaulescent. Leaves bipinnate but the lower pair of divisions elongated so as to seem ternate, 4-6′ long; segments broadly ovate, deeply and unequally 3-5-lobed and then again 2-3-toothed with coarse and triangular and rigid acerose teeth, segments 6-9″ long with cuneate base; leaves with 3-5 pairs of pinnæ, rigid and leathery, glaucous, smooth, on stout and angled but wingless petioles shorter than the blades. Peduncles stout, mostly declined, 6′ long. Involucre none. Rays slender, about equal, 10-15, 1-1½′ long. Involucels rigid, subulate-acuminate, 4-6″ long, not hyaline, longer than the many flowering pedicels. Flowers apparently yellow. Fruiting pedicels few, 5-8″ long, very stout. Fruit smooth, oval-ovate, with a cordate base and obtuse tip, about 5″ long and 3″ wide, the wings about as wide as the narrowly elliptical body, narrow at tip, thin, face with filiform and slightly raised ribs and normally 3 oil tubes in the intervals, commissure with 2 strong oil tubes on each side and 1-2 others usually reaching half way. Near Big Pine, Inyo Co. California at 4000° alt. May 30 1906, No. 7225 Hall and Chandler. Tropical life zone.

Cogswellia Chandleri n. sp. Root tuberous and with a slender foot. Stems slender, apparently single, erect, branching close to the ground and with several short internodes and with a peduncle mostly at each node except the first. Leaves bipinnate, triangular-ovate in outline, 3-4′ long exclusive of the petiole; lowest pair of pinnæ short-stalked, the others sessile; pinnules divided nearly to the base into several pairs

of linear-oblong and obtuse but apiculate and short-pubescent divisions. Root leaves with stout and nearly marginless petioles, 4-6′ long. Stem leaves with conspicuous, very broad, clasping, hyaline-margined and nerved petioles which on all but the lowest leaves are wholly dilated and an inch long. Peduncles stout, erect, 4-6′ long, with 10-15 unequal and slender rays 1-2½′ long, subtended by a lanceolate, green and hyaline-margined and broad bract 6-9″ long and which is lobed or toothed above. Involucels 4-6″ long, broadly obovate, hyaline-margined, abruptly acuminate, longer than the many flowered pedicels. Fruit immature but evidently becoming elliptical and about 6″ long, with rather broad wings truncate above and narrowed below. Oil tubes 2-3 in the intervals. Ribs filiform and raised into narrow wings toward the tip. Manifestly a close ally to C. vaginata and the caruifolia group, and closest to C. marginata which grows on the western side of the Sierras. Nelson Range Lee District Inyo Co. California, May 23 1906, No. 7157 Hall and Chandler, Tropical life zone.

Cogswellia bicolor (Watson) Jones. It would appear that Coulter and Rose have never seen mature fruit of this species for they describe it as linear-oblong when it is narrowly elliptical. They say the wings are very narrow, when they are a millimeter wide and very conspicuous. They say that the dorsal and intermediate ribs are nearly obsolete, when they are very conspicuous and raised. This is probably due to the fact that the fruit does not mature till the leaves are dead. At first the fruit is nearly terete and broadly linear, differing but little from their genus Leibergia, as it matures the flesh on the fruit dries out from the face till the face is barely convex, and then the white ribs appear as strong lines on the very dark face. The inner face is then concave and the cross section of the fruit is nearly linear and very thin. These notes are taken from careful field study from the flowering time to maturity of the seeds.

Cymopterus Duchesnensis, n sp. Myton Utah among loose rocks on southern slopes of mesas. Densely cæspitose, with deep and rather fleshy, coarse and branched roots. Crowns several, coarse and thick (about an inch thick), with imbricated and very thick and woody old leaf-petioles an inch long which become slightly fibrous when they rot. Nearly acaulescent. Leaves many, on long and slender petioles, 3-5′ long, erect, bright-green, thick, pinnate, of one or two pairs of deltoid-cu-

neate leaflets, 1-1½′ long which are varyingly 3-lobed or incised and the lobes 2-3-toothed and with a sharp apiculation. Leaves leathery and smooth; petioles not margined nor enlarged below except at very base; lower pair of leaflets distant. Peduncles erect, 6-8′ long, rather slender. Involucres mostly of one linear-subulate and green bract not over 6″ long, but mostly wanting. Rays 10-15 about 2′ long, the inner ones sometimes shorter, all except the spreading outer ones erect and rather slender. Involucels of several green bracts, with very narrow and hyaline margins, linear-subulate and 6″ long, but many of them much reduced and triangular, 1-2″ long, barely united below. Pedicels 3-4″ long, shorter than the fruit, stout, erect or spreading. Flowers yellow, small. Fruit about 5″ long and 3-4″ wide including the wings, emarginate at both ends. Seeds about a line wide and 4″ long, very concave on the inner face so that the two make an oblately rounded cross section, elliptical in outline as to length; lateral wings thick and corky at very base; then quickly narrowed to a thin area which continues to the margin; dorsal wings either thickened at insertion or thin, but usually a trifle thickened beyond and then thin again, mostly as wide as the lateral ones which are twiec the width of the seed, 2-2½″ wide, all much wrinkled. Oil tubes very narrow, 4-6 in the intervals and 2 on each edge of the commissure and sometimes more, but very faint. Skin of the commissure very much thickened and white. This evidently belongs to the purpureus section but has the seeds of the Pteryxia section and the leaves more like the Utahensis section. At a distance the green tufts remind one of Pæonia, a genus not found in the region. This is a very peculiar species. It grows in very poor soil partly alkaline, Lower Temperate life zone.

Leptotaenia multifida and its variety Eatoni. For the benefit of Mr. Rose who still holds that these species are distinct, the following field notes are furnished, in order to show that they cannot be maintained as separate species. Ravalli Montana material; seeds 8 mm. long, oil tubes and corky ridge conspicuous, rays many. Alta Montana material; seeds oblong, very flat, 13-15 mm. long, oil tubes absent and also corky nerve, pedicels many, leaves finely dissected. Lambert Valley Montana material; seeds 8 mm. long, with evident oil tubes and corky lateral nerve, foliage less dissected, rays many. Blackfoot Glacier Montana material; fruit 8-10 mm. long, very

flat, rays many; oil tubes evident, foliage finely dissected. Susanville California material; fruit oblong, 15 mm. long, very flat, without lateral corky nerve, rays many, final divisions acutish, linear, 1-1½″ wide, oil tubes none. Summit California material fruit 10-15 mm. long, oil tubes 4 in the intervals, corky nerve evident, final divisions short and wide, 2-3″ long and 1″ wide. My No. 5532 Thistle, Utah; fruit 10-12 mm. long, very flat, corky nerve evident below, commissural oil tubes sometimes evident, leaf segments like the last but blunt, 2-3″ long and ½-1″ wide. My No. 1699 from City Creek near Salt Lake City; fruit 14-16 mm. long, narrowly oblong, without oil tubes or corky nerve, pedicels many, leaf segments acutish and like the last, seed face very flat. Muncy Nevada material; fruit 10-14 mm. long, elliptical, without oil tubes and with lateral corky nerve, very flat, divisions of leaves ½-1″ wide, 2-8″ long, blunt, rays many. Fort Cove Utah material; fruit 13-14 mm. long, elliptical and acutish, rays rather few, no oil tubes, fruit thick and concave, no corky nerve, leaf segments very sharp, linear to triangular, ½-4″ long, not over 1″ wide. Cuddy Mts. Idaho material referred to by Mr. Rose; fruit broadly elliptical, 13-15 mm. long, oil tubes mostly present, corky lateral nerve represented by 3 lines barely at all raised and not thickened, rays many, leaf segments about ½″ wide and 2″ long. Seven Devils Mts. Idaho material; fruit narrowly oblong. 18 mm. long, rays few, oil tubes none, lateral corky nerve absent, pedicels 12″ long, leaf segments linear and delicate. 3-12″ long, not over 1″ wide, acuminate. Robinson Utah material; fruit elliptical, 13-15 mm. long, segments short, ½-1″ wide, 2-3″ long, fruit flat, oil tubes evident on face but not on commissure, corky lateral nerve absent but represented by a nerve only, rays few to many; Ruby Hill Nevada material, this has large fruit and short segments: Salina Canon Utah. My No. 5176w has many rays; Silver Reef Utah. My No. 5441s, referred to by Rose is too immature to tell what it is as is true of the above; Carson City Nevada material; my No. 3878; segments obtuse and the same as in the Cuddy Mts. material, fruit 10 mm. long, concave, with oil tubes, rays many. Tehachapi Califorina material; segments short and blunt, fruit 16-18 mm. long. Nelson's No. 4484 from Wyoming; fruit flat,, 10-12 mm. long, without corky nerve, oil tubes present, rays many, leaf segments short and blunt, this would go for Eatoni in spite of the fruit character. Bingham Utah material:

fruit 12-16 mm. long, no corky nerve nor oil tubes, segments long and narrow and obtusish, rays many. Chat California material: fruit 9 mm. long, narrowly elliptical, oil tubes and corky nerve present, rays many, leaf segments only acutish, just like the Susanville material with large fruit. Carson City Nevada material got in 1897, same as Chat but fruit large. Spring Creek Nevada material: leaflets like the Ruby hill ones cited by Rose as L. multifida but immature fruit is 12 mm. long and when mature would be more. Aurum Nevada materials, cited by Rose as L. multifida, were in flower and with the same blunt segments less than a line wide and 4-8″ long, fruit gathered later from the same plants ranges from 10-14 mm. long, elliptical, concave, with raised lateral nerve, oil tubes present, rays rather many. Rose cites my No. 3878 referred to above as L. multifida. The Ruby Hill Nevada material cited by Rose as L. multifida has the same short and blunt leaflets, and the Carson City material differs in no respect except in the smaller fruit from the others with fruit 18 mm. long, while specimens gathered alongside of the others have the fruit 18 mm. long, but identical otherwise. Now all these citations show conclusively that neither Mr. Rose nor any other person can make two distainct species out of this material as it is impossible to get any character that amounts to anything specifically.

Townsendia mensana n sp. Densely cespitose, perennial, with heads sessile among the rosulate leaves,the mats 2-4′ wide. Ashy throughout. Leaves linear-spatulate, 6-12″ long, thick, acute. Heads 4″ long and wide with rays ½″ wide and about 3″ long, many. Scales narrowly elliptical, shortly acuminate, with broad and hyaline margins lacerate. Pappus of ray setose and about twice the width of the akene; pappus of the disk of slender and sparsely toothed setæ as long as the flowers. Akenes with conspicuously thickened and callous edges. This belongs to the Fendleri section. Benches of the Uintas from 6000-7500° alt. at Theodore Utah. I also refer material here from Silver City Utah April 4, 1896 and Mercur Utah June 6 1896 and McIntyre's ranch Utah May 18 1891.

Townsendia incana var. **prolixa** n. var. Winter annual with slender tap root. Root leaves 1½-3′ long, on long petioles, obovate-spatulate to broadly oblanceolate, sparsely pubescent; stem leaves oblanceolate, 1-1½′ long, triangular-acute, with short and broad petiole. Heads on short peduncles ½-3′ long, which have 1-3 leaves, the upper one being either invo-

lucrate or near the head. Central head of plant generally twice as large as the others and on an erect and leafy peduncle. Stems with many proliferous branches below and 2-4′ long and naked, ending in a cluster of 1-3 flowers, and either simple or short-branched, the heads with disk about 6″ high and 6-8″ wide. Rays 2″ wide and 8-10″ long, bright-pink. Scales with broad, lacerate and hyaline margins, acute. Pappus of ray about as long as width of akene, that of the disk as long as the flowers and plumose, the teeth being longer than the width of the hair, setæ often forked at base. Plants conspicuous by being nearly green and proliferous with long rays, but there are intergrades. Common throughout the Duchesne valley Utah in exposed and gravelly places in the Lower Temperate life zone, in May. My material gathered mostly on May 20 1908.

Townsendia incana is correctly described by Torrey and Gray as being a perennial with sessile heads, short and spatulate leaves 6-12″ long, strigose-ashy throughout; heads with disk about 6″ wide and high, with rays a line wide and mostly shorter than the heads; pappus of ray about two to three times the width of the akene, and that of the disk as long as the flowers, with setæ mostly simple and teeth shorter than the width of the scale or hair. The type and variety differ conspicuously but they have the same range and intergrade freely.

Parthenium alpinum var. **ligulatum** n. var. Ligule oval to round, 3-toothed at tip, 1-2″ long, rough-pubescent below, rigid. Pappus adnate to the very thick corolla tube, green, lacerate, triangular, about as long as the tube. Akenes hoary, oblong-ovate, 2″ long. Leaves ashy with minute appressed and white hairs. Hairs in the axils very long and slender, jointed, 2-4″ long, nearly straight. Leaves spatulate-oblanceolate. Plants very closely resemble Eriogonum acaule and grow in similar situations on nearly bare clayey and gravelly knolls on ridges at 6000° alt. forming dense mats 6-12′ wide, with thick and branched roots, habit also of Actinella acaulis. Theodore Utah, Lower Temperate life zone.

MR. ROSE AND THE UMBELLIFERAE.

In a recent number from the National Museum Mr. Rose goes over certain genera criticised by me in my last Contributions. He corrects his error in the generic character of Leptotænia pointed out by me, but does not correct the others. He accepts Cogswellia as the correct name for Peucedanum in his limited sense, and adds names of species that I did not care to recognize either from lack of material or because I knew they were not good species.

Mr. Rose, in commenting on my reductions, says there is no use in opposing such well-established genera as those he has separated from Cogswellia (Peucedanum), etc. Now a genus to be well established must first rest on sure natural grounds, and, second, must be properly characterized. I have shown that they do not rest on natural grounds, that they are not properly characterized and that often species referred to them cannot be found in the keys. Let us take up in order the genera recognized by Rose.

Phellopterus. This is credited to Torrey & Gray's Flora 1 623, but there is no such genus published there. It is, however, given as a section of Cymopterus by Nuttall and approved by them. Its character there given is "Calyx teeth minute; pericarp somewhat corky; commissure with 4 vittæ; carpophore none." Coulter and Rose in erecting this into a genus, p. 166, give it as of Nutt. when it should be (Nutt.) C. & R. They give the characters of the genus so far as paralleling Nuttall is concerned "Calyx teeth evident." Pericarp not mentioned but wings thick or thin. Commissure with 4 to 8 vittæ. Stylopodium wanting. Now as stylopodium is wanting in the whole genus of Cymopterus and its segregates according to Coulter and Rose, and as the oil tubes are equally variable in the whole genus there is not a character given by Nuttall that they recognize as binding. In addition to that neither Nuttall nor Torrey and Gray recognized it as a good genus and nobody since has done so till Coulter and Rose did. The figure given by them (p. 166) would seem to indicate that the genus was distinct but that figure does not represent

the genus as C. Utahensis Jones has wings as thin at insertion as in the other genera. In looking over Pteryxia and Aulospermum we do not find a single character of Phellopterus that is not found in one or the other. The chief character of leathery leaves and tuberous roots they do not give at all. It is correctly characterized on p. 25 of my Contributions No. 12 as a section of Cymopterus which, of course, intergrades with the others as is shown by C. Utahensis, etc. It is also made to include Aulospermum C. & R. which is a curious mixture containing two groups fully as distinct from each other as Phellopterus and Pteryxia, namely A. longipes, glaucum, Watsoni, and Ibapense on the one hand and Panamintensis, Jonesii, cinerarium, purpureum and Rosei on the other. The first group has the tuberous roots, leathery and whitish leaves not rigid nor sharply toothed, and concave seed face, and comes next to Phellopterus, shading into it. The second group does not have the tuberous but rather woody roots, and is really made up of two distinct parts which I have properly placed in separate sections (p. 27), one part going into Pteryxia and the other into Scopulicola. This disposes of Aulospermum as it is not valuable even as a section as characterized by them because of its diverse groups, part belonging to Phellopterus, part to Pteryxia and part to Scopulicola.

Pteryxia. This is characterized exactly in the same way by Nuttall, and on the same page as Phellopterus and should have been published as Pteryxia (Nutt.) C. & R. This is given by Torrey and Gray as "Calyx teeth distinct, lanceolate; wings of the carpels broad; commissure with 4-10 vittæ; carpophore free, 2-parted." Coulter and Rose (p. 170) give the similar characters as "Calyx teeth evident" (same as in Phellopterus); lateral ribs with broad wings, thin throughout (while they figure them as thick at base), dorsal and intermediate from strongly ribbed to broadly winged; oil tubes several; nothing said about the carpophore. From this we find not a single character given by Nuttall is recognized as characteristic. The only character that has any permanence is in the woody and not evidently tuberous root, and this they do not mention at all. They add a character not given by Nuttall in the much dissected and sharp-pointed leaves, but even this shades directly into the Panamintense-purpureum group which I place in Scopulicola and Pteryxia, and this in turn shades into the Phellopterus group.

Taking up Cymopterus proper, which I call section Eucymopterus, Coulter and Rose characterize the genus on C. Fendleri and C. acaule and the novice would have great difficulty in finding C. megacephalus and globosus from their generic character in this genus. Why they did not make two genera out of this is surprising for the yellow-flowered and dark-green-leaved, almost involucreless C. Fendleri and its var. Newberryi form a group very marked from the white-flowered and glaucous-leaved looking and hyaline-involucred species of the rest of the genus.

Rhysopterus. This is characterized on page 185 by Coulter and Rose. They give the generic character as with obtuse ribs while R. corrugatus has acute ribs, in addition they refer Cymopterus globosus to Cymopterus while it is congeneric with C. corrugatus which they refer to Rhysopterus. This shows the instability of this genus.

Oreoxis. They put this far out of its proper place in the family and near to Thaspium, referring half of the species that properly belong to it to Pseudocymopterus, while it is manifestly allied to the Pteryxia and Scopulicola groups particularly in vegetative characters. This group should embrace not only the species referred to it but also C. anisatus, bipinnatus and Humboldtianus, C anisatus showing the intergrading toward the Pteryxia group.

Pseudocymopterus. This as interpreted by Coulter and Rose is untenable for it includes widely separated species, the only thing to do with it is to consider it as a distinct genus confined, as they at first made it, to Pseudocymopterus montanus, or to place it as a species of Ligusticum or to consider it as an anomalous Cymopterus as I have done. To refer C. anisatus and bipinnatus to it as they have done destroys it. The habit, leaf dissection, and fruit characters must keep them in separate groups. So far as Cymopterus and its segregates go I have shown that the segregates are untenable because they have not been and cannot be generically segregated on any character that sticks, and that they cannot find their own species in the genera that they have erected.

Cogswellia (Peucedanum). The segregates from this genus which they call Lomatium, Euryptera and Cynomarathrum I have retained in this genus. Lomatium, as I have shown, is untenable and has been abandoned by Rose.

Euryptera. This can be maintained only on the combina-

tion of rigid and not greatly dissected leaves and leptotaenioid fruit, no other character holds at all, but the same kind of fruit is found in my section Campicola of Cogswellia and the same kind of leaves is found in the section Crassipedunculata of Cogswellia, so both characters fail as generic ones. The genus is manifestly congeneric with Cogswellia though forming a very good section.

Cynomarathrum. This proposed genus has less legs to stand on than any proposed by Coulter and Rose, and yet Mr. Rose speaks of this particularly as "well established." Now let us see what it stands on. This is the character given by Coulter and Rose: "Calyx teeth evident. Fruit strongly flattened dorsally, oblong. Carpel with sharp or winged dorsal and intermediate ribs and broader winged laterals. Stylopodium flat but evident. Oil tubes mostly several in the intervals or obscure. Seed dorsally flattened, with plane face." Vegetative characters are the same as in Cymopterus section Pteryxia and so are omitted. Now referring back to Pteryxia we find "Calyx teeth evident. Fruit oblong to orbicular in outline. Carpel mostly strongly flattened dorsally, with wings thin throughout, lateral ribs with broad wings, dorsal and intermediate from strongly ribbed to broadly winged, Stylopodium wanting. Oil tubes several in the intervals. Seed face plane or with a broad and shallow concavity." Now in looking over the two characters we find nothing in Cynomarathrum that is not also found in Pteryxia except that the stylopodium is wanting in the latter and present in the former, which is good if true, but it is not true. There is always a rudiment of a stylopodium in Pteryxia, mostly with a depressed center, while in Cynomarathrum scabrum whose type is in my herbarium it is a mere rudiment, no more than in Pteryxia; this is also true of my material of C. Eastwoodæ and Parryi. Hence so far as the character given by Coulter and Rose is concerned Cynomarathrum and Pteryxia are the same. The fact is they are quite similar, though no complete intergradation is yet known. The relationship to Cymopterus anisatus is also quite close. Now taking the character given by Coulter and Rose, some of the species of four genera can be placed in Cynomarathrum just as well as where they are. These species are Cymopterus lapidosus Jones, Lomatium anomalum Jones, Pteryxia species and Cynomarathrum species. Cynomarathrum therefore should be recharacterized as I have done in

Contributions No. 12, p. 32, and confined to C. Nuttallii and Parryi and placed as a section of Cogswellia. The rest of the species should be placed in Eucogswellia section and next in generic relationship to Cymopterus as I have placed them on page 33.

So far as the work on the Umbelliferæ criticised by me is concerned Mr. Rose has not been in the west only as far as Wyoming, and then only once, and recently in a part of Arizona, while the whole of the great west where these genera abound he has never seen, and his opinions of specific and generic limitations are therefore drawn from closet work alone. In addition Mr. Rose confesses in this work that he is rather following a fad than adding anything new to our knowledge, in splitting up genera, and to this fact my criticism has been specially directed, in order that botanists may know the reason for his many changes in names. As I have said before it is greatly to be regretted that he has been drawn so far away from the correct conception of generic and specific limitation. In view of the fact that in the same issue I criticised severely those who create so many species from purely selfish motives, it might be inferred that I also included Coulter and Rose among them, but this is an erroneous idea, for I have always thought them to be above such motives, and have therefore spent the time to go over their work critically, which I would not have done had I believed otherwise.

Mr. Rose, in speaking of my new genus Cusickia, is unable to see any generic character in Cusickia minor, stating that I have not given any. If he will take the trouble to read over his generic character for Leptotænia and my character for Cusickia he will find them differing far more than any genera he has created, or if he does not others can.

WESTERN AMERICAN BIRCHES, by B. T. Butler.

This paper in the Torrey Bulletin for August, 1909 is the result of about five days' field work at Bigfork, Montana, or portions of five days. The writer has had charge of the botanical work at the Biological station of the State University there for the last two years, and Mr. Butler was there a short time and did a little botanical work, being out with the writer on three occasions, once at Rost lake, once at Yellow Bay, and at Bigfork. In addition to this he collected a little material at Ravalli. The writer had already written a revision of Betula which was used on the material gathered on these trips.

At Rost Lake the writer pointed out to Mr. Butler the various forms of B. glandulosa, all intergrading and growing under the same ecological conditions. Out of this material he makes two new species which have no standing whatever, B. glandulifera and B. Elrodiana, while Rydberg adds another from Rost Lake under the name of B. crenata, all forms of B. glandulosa. To these Butler adds still another from Ravalli as B. obovata, this also is a form of the above. Butler's species amount simply to a description of individual plants to which he gives new names and from which I also gathered material (except the Ravalli specimens).

Mr. Butler then takes up B. microphylla describing as species some of the different forms, such as B. fontinalis Sargent, B. Sandbergii Britton, B. Utahensis Britton and B. Piperi Britton. This species is characterized by the bark not exfoliating in papery layers and not peeling off when cut through to the wood as is the case with the paper birches. It is a low shrub, rarely over 15 feet high in the type and in the larger leaved var. **Utahensis** (Britton Torr. Bull. 31 165 as species) it often is thirty feet high and six inches in diameter. It always grows in clumps.

Mr. Butler then takes up the paper birches and recognizes every name ever applied to them but one as distinct species. Among the forms of B. alba are B. Alaskana Sargent and B. papyrifera Marsh, which he recognizes as separate species and distinct from alba though they are only forms.

Betula alba var. pendula (Roth Ten. Fl. Germ, as species).

The forms of this variety which he recognizes as species are B. subcordata Rydberg, a proposed new species, B. occidentalis Hooker, and B. Montanensis another proposed species of his own gathered at Yellow Bay at my suggestion as an example of a diseased and very old tree with thicker bark and generally abnormal condition due to the inroads of the waves of Flathead Lake on the roots.

Mr. Butler is a conscientious and modest young man with great musical talent, who is taking his last year at Bronx Park and Columbia for his Ph. D. degree, and this is a part of that work. His ideas of specific limitation or rather lack of limitation he has gotten wholly from that source and so has never had any correct conception of what a species is, but regards it as simply any old form that he may wish to describe as new. The writer would be glad to subscribe several cents toward a fund for the education of the professors who are responsible for this kind of work so that they might go to some botanical kindergarten where they could learn that a plant growing in the shade or on a north slope or in a cold lake will differ from another from the same parent which grows in a warmer and drier situation, and that this condition will be reversed when the offspring of these plants occupy reversed conditions; and where they could learn that a poodle dog running around a house is not necessarily two distinct species because they see his tail only on the south side and later on his head only on the north side.

NYCTAGINACAE, by Standley.

This recent publication by the Department of Botany in the Smithsonian Institute is ostensibly a review of the Nyctaginaceæ, but actually it is an attempt to vindicate P. A. Rydberg, of whom the author is a protege.

The writer of this review of Standley's work published a monograph of the Nyctaginaceæ in Contributions No. 10. This work was based on nearly thirty years' observations in the field and on a very large amount of herbarium material.

Immediately after the publication of this P. A. Rydberg, piqued at the necessary criticisms of the writer on his poor work on Astragalus, published another review of the same family, making a great many changes in names and erecting many forms into species particularly from material that I had collected and of which Rydberg had seen but single specimens. The motive of this work was perfectly plain. It now seems that there is a doubt of Rydberg's success and so his pupil must rush to the rescue, Quixote like.

This last review by a young man with almost no field experience is characterized by a very large amount of assumption on a very small basis of fact. In addition his warped judgment is shown in all matters suggested by me where he is apparently moved by the same spirit that causes the Irishman to become Democratic when he emigrates to this country, because he is "forninst the Government." For example, he rejects Boerhavia Thornberi Jones, calling it a synonym of B. hirsuta, while it is remarkably distinct from it. He keeps up all of Rydberg's fictitious species and also A. falsa (a form of A. fragrans based on material of mine also), and adds a numberof his own which are equally fictitious, though he has scarcely seen one of them growing and has for the most part but single specimens on which to base his judgment. He caps the climax of absurdity by calling Abronia micrantha var. pedunculata Jones a species while he has never seen but a single specimen of it and does not know that I have plenty of specimens of it with both sessile and peduncled heads on the same plant. I may wait in breathless suspense for him to in-

form me as to the status of these specimens. Shall I call them Abronia micantha-pedunculata or Abronia pedunculo-micrantha, or Abronia micrantha x pedunculata. Mr. Standley now shares the high honor along with Greene of making two species of out specimens from the same plant from my collections.

I suppose that free advice is not appreciated and yet I would venture to suggest that though inspirational botany may be a great thing in a certain limited area of the east and wholly supplant reason, common sense and field experience, the people of the west are so benighted that they are as yet unable to distinguish the difference between the divine inspirational halo and New York fog, and therefore, like the people of Missouri, have to be shown.

FOREST TREES OF THE UNITED STATES,
by N. L. Britton.

This sumptuous and exceptionally well printed volume is remarkable for its cost. If there is any reason for its appearance other than a rivalry among publishers the text fails to show it. It is not to be compared with Sargent's work in accuracy, nor even with the Manual by Sargent.

GRAY'S MANUAL, SEVENTH EDITION.

The new edition of Gray's Manual has recently appeared under the joint authorship of Dr. Robinson and Mr. Fernald.

It is the same compact and handy volume as before, preserving the main features which have become so familiar to two generations of botanists, and yet is brought up to date in nomenclature and arrangement of orders. The Grayan method of description is still retained. Alterations in sequence and form are many, but the changes are more apparent than real. The natural order of families according to their genetic relationship is adopted placing the lowest families first, but for the most part the order of the genera and species in the families is reversed, placing the highest first which is a poor arrangement, and follows Gray, Watson, Britton and the rest. The keys have for the most part been entirely reconstructed and for this all botanists owe them a great debt of gratitude. Britton's 3-volume Flora copied bodily the old key of Gray's Manual and without credit. The book is remarkably free from clerical and typographical errors. A few occur here and there of minor importance, as in Juncus the decimal point is misplaced in giving the measurement of the seeds so that seeds seem to be longer than the pods in some species. I notice Corallorhiza maculata is credited to Rafinesque who so far as I can find published only a Cladorhiza maculata. Betula crispa is credited to Aiton when it should be Dryand, etc., but such blunders no book can wholly avoid, as the writer has found out too often in his own work. Alisma Plantago L. is published as A. Plantago aquatica, while Linnaeus did not publish the name. Salicornia Europœa is published as such while Linnæus seems to have given it as S. Europœa herbacea.

The most material changes or noticeable ones are in the adoption of the first name of a species instead of the first name in the genus. This as we know is done against the authors' better judgment in order to conform to the Vienna code, and though perhaps necessary is to be regretted. This alters many names of well known plants, but is reduced to a minimum by the retention of the excepted genera such Astragalus, etc. The adoption of such names as Polypodium polypodioides is indefensible and absurd.

Montia Chamissonis is given as M. Chamisoi (Ledeb.) Durand and Jackson instead of Greene. Chamissonis is the correct form. It looks like quibbling.

The worst feature of the book is the uneven recognition of species. The joint authorship of a book is never a success. Dr. Robinson's conception of species is excellent, also that of Eaton, Ames and Hitchcock, but whoever wrote the Cyperaceæ and some other lower orders seems to have had no conception of species at all, about as bad as that of Greene and Rydberg. Such a species as Scirpus rebrotinctus has no standing at all.. The work on Carex is confusing. In comparing Carex with its treatment in Britton's Flora it suffers greatly. No one would imagine that C. teretiuscula in Britton's Flora and C. diandra in the Manual (synonyms) were the same species. The engravings in the Manual are much inferior, poorly etched and poorly printed. In the matter of the engravings I take direct issue with Agnes Chase in Rhodora 10 207 where she speaks of the engravings with unstinted praise.

One of the most commendable things in the book is the ignoring of the split genera of Britton, Rydberg and Small. For some years the Brittonians have raised a great hue and cry about the new and original work done by them in splitting up the Grayan genera. A recent repetition of this is in the Torrey Bulletin where the new Manual was reviewed through Bronx Park glasses. Anything published by Harvard is like a red flag before a bull to Bronx Park. Whenever Harvard sneezes Bronx Park has a fit, and it is a standing joke among botanists. This critique says of the work of Ames among the orchids that it fails to recognize the recent studies of Rydberg in Habenaria, etc., as though Rydberg had done any original work in this genus. When we come to look at Rydberg's work we find he has simply raised Gray's sections to generic rank and given new names to them and renamed all the species. The limitations to the sections were done for the most part before Rydberg was born. Rydberg tries to justify this work by saying that some of the changes have already been recognized by European botanists. Now if there is any crazy thing that some European botanist has not done in the near or remote past the writer would like to have it mentioned, and to use that as an excuse for doing some other crazy thing is no argument in its favor. Rydberg attempted to do the same thing in Astragalus, but he went a little farther and tried to split up some of Gray's

sections and made a miserable mess of it as I have shown in my Contributions. An amusing part of this critique is that this Manual ought to be called Britton's Manual as it is nearer Britton's Flora than Gray's Manual. Perhaps there is something to this suggestion as Britton's Flora practically copied the old Gray's Manual altering the phraseology and then adding a great deal of other matter that was not specific, but we have not as yet seen any acknowledgment from Britton of his indebtedness to Gray's Manual and are not likely to see it.

The writer had hoped that the book would discard some of the great defects of the botanies of his boyhood days. In this he has not been wholly disappointed, as there have been many improvements, but the one great defect that has run through every botany published in the last 100 years still prevails, namely see-saw descriptions. Over 25 years ago the writer pointed out this defect and in his Contributions indicated the way to remedy it and in his Ferns of the West (published in 1883) gave a practical example of how to do it. This was again exemplified in the revision of the Onions, and last year in the revision of the Willow Family. It is true that a part of the suggestion has been adopted, namely taking the same organs in the same order in related species. For example in Betula on which the writer is just now working the Manual takes up the leaves in the same order in B. pendula and B. alba, the twigs are taken up first, then the leaves, catkins and scales in order which is good and a very great improvement on the hit or miss way of Gray's former manual. But there the good work stops just as it does in Britton's Flora. Britton's flora practically copies Gray's old manual and then throws in about as much more stuff with no attempt at antithetical comparison in any of it, much of which would apply to any one of several related species.

Now to be specific let us take B. pendula and B. alba in the Manual. It is impossible to make a suitable comparison with the same species in Britton's Flora as he evidently knows very little about the birches, but we will take up two related species there later.

In the key we find that B. pendula has "strictly glabrous branches and leaves" and B. alba has puberulent or pubescent branches and variably hairy leaves. This is the proper antithetical arrangement if it is true. But we find at the outset that the twigs of pendula are very warty. Now the Manual in the glossary says

that glabrous means "smooth." If very warty is smooth then the writer must not know what smooth is. It is evident that the reviser of the Betulaceæ took glabrous to mean not hairy, which is not true. But brushing this aside it still remains that B. pendula has not hairy twigs and leaves while B. alba has hairy twigs and leaves, or at least the beginning of hairs (puberulent) which is good if true, but even this fails in the var. minor which for all we know is a form of B. pendula. which shows that the character of pubescence is a feeble diagnosis. Now taking the branches we find that B. pendula has "slender, flexuous and drooping branches" while B. alba has ascending branches, nothing said about the slenderness or flexuostity and so they might be either so far as the text goes, while the writer knows that the branches of B. alba are often drooping. This is what I call see-saw description, and is simply a waste of space and a waste of the patience of the student who tries to get anything out of it. The branchlets of B. pendula are "usually verrucose with resiniferous atoms" which is a long way of saying resinous-warty. In B. alba we find that its branchlets are often resinous-warty too but mixed with long hairs when present which is self evident if the branchlets are hairy as already stated. So briefly stated the branchlets of B. pendula are very resinous-warty, and of B. alba less so which fully covers the ground and in about a third of the space. In B. pendula the "leaves are glutinous when young, firm, rhomic-ovate to deltoid or broad-ovate, subcunate, truncate or subcordate at base, long-acumine, slender-petioled." Now if the leaves are cuneate at base and long-acuminate at tip they cannot help being rhombic-ovate if they are broadly-ovate. If they are cuneate to cordate at base they run the gamut of change and there is no need of mentioning the basal shape at all. B. alba has ovate leaves, taper-pointed, rounded to cuneate at base, 3-6 cm. long, smooth and green above, pale, glandular-dotted, and a little hairy on the veins beneath, sharply and unequally doubly-serrate. Now comparing with B. pendula we find the leaves are glutinous when young; nothing said about it in alba, but in two varieties they are glutinous. In pendula the leaves are firm, nothing said about alba. In pendula the leaves are broadly ovate to deltoid through rhombic ovate; in alba they are ovate but they are cuneate at base and taperpointed at tip and therefore must be rhombic at times. In other words the leaves of B. alba are ovate and those of B. pendula are broader, which is a

much shorter and a fully as accurate way of stating it. The base is rounded to cuneate, but we find the var. cordata has cordate leaves. So the less said about the bases of the leaves the better. In B. pendula the leaves are long-acuminate, and in alba taper-pointed, if taperpointed is not long or short acuminate there is nothing in the text to show it. In B. pendula the leaves are slender petioled; nothing said about B. alba, but we know they are slender petioled. In B. pendula the length of the leaves is not given while in B. alba it is given, which is useless for comparison. In B. pendula the fertile catkins are 1.5-3 cm. long and 6-9mm. wide; in B. alba they are 1.5-4.5cm. long and 6-16mm. wide, which is another way of saying that in B. alba they are a little longer and wider. In B. pendula they are pendulous, in B. alba they are spreading or drooping, a distinction that amounts to very little. In B. pendula they are on unknown peduncles, in B. alba on slender peduncles, which is also useless for comparison. In B. pendula the scale character is given in Italics which the authors tell us is of special significance, but in B. alba the scale character is not given in Italics and so again we have a see-saw description of the special character. In B. pendula the scales are ascending, brown to straw-colored, 3-5 mm. long, smooth except for the ciliate edge. In B. alba they are also ascending (a character that therefore does not belong in either description but belongs in the key above), mostly ciliate-edged, a character that also belongs in the key above, nothing said about the smoothness, 3-7 mm. long, in other words a trifle longer normally.

A revised description of the two species that contains all the essential points as given in the text would be about as follows:

Betula pendula. Twigs very resinous-warty, without hairs, drooping. Leaves broadly ovate to deltoid, not hairy. Fertile catkins 1.5-4.5 cm. long, 6-9 mm. wide.

Betula alba. Twigs not very resinous-warty, hairy (hairs sometimes minute), more ascending. Leaves ovate, hairy below. Fertile catkins a little longer and wider.

In Britton's Flora we will take the first two species of birch. B. populifolia is a slender tree reaching 45° high and with 1.5° thick trunk, while B. papyrifera is 80° high and with 3° thick trunk, which makes it just as slender a tree as the other or more so, but this fact we have to sift out as a description of the bark is interlarded in B. populifolia while in the other species this is reserved for the next sentence. We are informed that the bark

of B. papyrifera except on the young twigs peels off in thin layers. Then we chase up the bark in the other species and find that it peels up tardily in thin sheets. What difference there is between layers and sheets Britton does not state nor does any one else know. If there is no differenc then there is no use in giving it. We find that the bark of B. populifolia is very white and smooth but we are not informed whether it is white or black, smooth or rough in the other. In B. populifolia we are given some information about the twigs, but in B. papyrifera nothing. The leaves in B. populifolia are deltoid, in B. papyrifera ovate, which is the proper way to put it. In B. populifolia they are pubescent on the veins when young, nearly glabrous when old, minutely glandular, dark-green above, light-green beneath; in B. papyrifera we chase down several lines and finally discover by readjusting the description that they are dark-green and glabrous above, glandular and pubescent on the veins beneath, nothing said about the color of the lower side. Now what difference there is in these two characters no one would ever guess unles he intends us to think that the leaves of B. populifolia are a little less pubescent when old, which could be stated in a third of the space. In B. populifolia the leaves are long-acuminate, sharply dentate, and commonly somewhat lobed (which statement his figure of the leaves belies), obtuse to truncate at base. In B. papyrifera we find the leaves are acute or acuminate, dentate and denticulate, ovate to subcordate at base. Now by a process of digestion and assimilation we find that B. populifolia has long-acuminate leaves and B. papyrifera acuminate leaves, nothing said about how long or how short-acuminate, B. populifolia has sharply dentate leaves and B. papyrifera dentate leaves, nothing said about how sharp or how bluntly dentate. By referring to the figures which are always excellent and by far the best thing in Britton's Flora we find that B. populifolia has coarsely, and obtusely dentate leaves, while B. papyrifera has very obscurely and acutely dentate leaves. B. papyrifera has denticulate leaves and nothing said about it in B. populifolia but the figure shows that it also has denticulate leaves and so this character has no place in either description but should have been put in the key to both. B. populifolia has truncate leaves at base and B. papyrifera also has truncate, cordate or obtuse bases, a description without a difference except that papyrifera has a more variable base than the other. We find that both species have slender petioles, a character that belongs in the key to both and

not in the description of either. In B. populifolia we find that the leaves are 1.5-2.5′ long, or in other words B. papyrifera has leaves normally about twice as long as B. populifolia but with a wider range in length, but when we come to examine the figures of the leaves we find that B. populifolia has leaves about a half longer than B. papyrifera, now which is right the figure or the description? We find the petioles channeled in B. populifolia and nothing said about it in the other. The male catkins of B. populifolia are 2-3′ long, and in B. papyrifera 2-4′ long, a distinction with scarcely a difference. The pistillate catkins of B. populifolia and B. papyrifera are cylindrical and this character therefore belongs in the key and not here, they are both slender-peduncled also,, which belongs in the key. In B. papyrifera the fertile catkins are described as spreading or drooping and figured as appressed and erect, nothing said about it in the other, but figured as ascending and spreading. In B. populifolia they are described as 9-18″ long, 3-5″ wide, and in B. papyrifera as 1-2′ long and ¼-½′ wide. We see a use of different denominations in measurement which is always bad, it should have been in the one 9-12″ long, and the other 12-24″ long, 3-5″ wide, and 3-6″ wide, this kind of juggling with figures implies a difference when there is none worth mention. When we come to examine the figures we find B. papyrifera has catkins about twice as wide as the other and the same length, but the experienced botanist sees at a glance what the student will not see that the catkins of B. populifolia are immature and never should have been figured at all. The fruiting bracts of B. populifolia are puberulent, 1-2″ long, with lateral lobes divergent, larger than the middle one. Those of B. papyrifera are 2-3″ long, puberlent or ciliate, nothing said about the lobes. When we come to examine the figures we find that the bracts of B. populifolia are figured as smooth and not ciliate or puberulent, and in B. papyrifera as smooth and ciliate. We find that the later al lobes of both are divergent, while the distinctive character as shown by the figures is not mentioned in the text at all, namely in B. populifera the lobes are deep and rounded including the central one, and in B. papyrifera they are very shallow and acute including the central one, which is wholly exserted from the others, while in B. populifolia the central lobe is but little exserted beyond the others. We find that the body of the nut is narrower than its wings in both species, a character that does not belong in the description of either.

Now out of all this botanical chaff what wheat can we find? It appears as if Gray's Manual and Britton's Flora are trying to describe the same two species.

Britton's characters for the two species simmered down and taking account of the figures would be about as follows:

Common characters. Bark white and peeling off in thin flakes. Leaves denticulate and acute, slender-petioled, large, glandular, dark-green and not hairy above. Fertile catkins cylindric, slender-peduncled, 9-24″ long. Fruiting bracts ciliate. Nut narrower than its wing.

Distinctive characters.

B. populifolia. Leaves deltoid, abruptly long-acuminate or tailed, coarsely and obtusely dentate, nearly devoid of hairs when old. Fruiting bracts with obtuse lobes, the central one little exserted beyond the others.

B. papyrifera. Leaves ovate, with more rounded base, acute to short acuminate but not tailed, obscurely and sharply dentate, pubescent. Fruiting bracts acute, the central one exserted wholly. Comparing these two sets of emasculated descriptions in the Manual and in Britton's Flora we find they agree well in a general way, and are brief and to the point if imperfect.

In spite of the great amount of chaff in Britton's Flora and the perpetually see-sawing descriptions it was the best thing ever printed on the eastern flora, because of the excellent figures, the exact citation of authorities, and the possibility of being able to sift out of the verbosity of descriptions the characters of the species. It still remains the best thing ever gotten out in the matter of figures and citations, but is much inferior to the new Gray's Manual in conciseness, and correct nomenclature, except in the Cyperaceæ which are better treated than in the Manual. Britton's Flora was a three volume affair and of larger dimensions, but except for the engravings it could as well have been condensed into a single volume without omitting any essentials. In the matter of cost Britton's Flora is not to be compared with the Manual, being almost prohibitive.

MR. HELLER AND NOMENCLACTURE.

The publication of the article on nomenclature in my last Contributions seems to have given Mr. Heller (in Muhlenbergia) a bad attack of mental colic, recurrent colic. His capacity to appreciate the motive and scope of my criticisms reminds one of the Englishman who after traveling extensively in this country returned home and said to his admiring friends "The Americans are a very clever people but they have many uncouth expressions, for example they say Where am I at, we would say Where his my 'at."

Mr. Heller says he believes that the first name applied to a thing should stand. Just so. For the last fifteen years we have heard nothing else, ad nauseam, except once a synonym always a synonym, as though this were a panacea for all botanical ills. If so then why does he not apply it? Why do not the other Brittonians? If priority is much more valuable than to accept the common usage of the botanical world and is in fact the sine qua non in botany why do they take the utterly inconsistent position that priority must not apply earlier than 1753 nor in any other language than Latin? What magic is there in the year 1753 any more than in 753, 53 or 3? No one is so stupid as to believe that botany began in 1753. Many plants were more accurately described by Pliny than by Linnæus; many by the old Greeks, Hindus, Chinese and even the Egyptians thousands of years ago, What magic is there in the Latin language especially the pigeon-latin that we are compelled to decipher in botanical works that would make Cicero turn in his grave to read Latin never was spoken by as many men as French which for generations was the Court language of the World, but neither of them ever was used by as many people as the English nor ever came as near to a World language as our tongue comes now. The reason most botanists take this year and this language as the starting points is not because they regard priority as valuable in the Dark Ages of botany, but because by starting there they are enabled to keep botanical names stable, and a stable nomenclature is the one great desideratum, and this can come only by common consent and not by any arbitrary rules whose application would upset the whole

fabric of accepted names as the Brittonian system has done and is doing in the hands of its adherents.

Now suppose Mr. Heller were to be consistent and really do what he says is the only thing to do, use prior names, he would naturally work the English language first. His botanical godfather Britton would allow him to follow his own example doubtless in putting a Latin tail on his English words, a la Manihota Britton for Manihot L. Suppose he takes up the gooseberries and currants to which he has given some study, his new names would pan out about as follows: gooseberrya lacustris Heller, Curranta reda Heller (it should be remembered that the great law of priority demands that we should publish the name exactly as it was first given, although Britton would allow us to Latinize the tail, apparently the most important part of it, we therefore must not say rubra but red-a). Now after he has Hellerized all the English names of these fruits and gotten the Hellerian tail properly adjusted to all, he will find that the Greek antedates the English, then he can get up another new set of names from the Sanscrit, then the Chinese, then he might take up the Egyptian and give still another batch of new names. By the time the botanical public has begun to recover from the last of these inflictions it is likely that the phonograph and the graphophone will be so perfected that they can take the ripple marks made by sound waves on prehistoric mud (now turned to stone) produced by the incoherent babblings of some of the simian ancestors of the Brittonians, and reproduce them so that they will be as lucid as some recent descriptions of plants, and will have far stronger claim to priority of publication than the Brittonian check list had at the time when it was said to have been published.

Yes, priority is a great thing—for making changes in established names.

Mr. Heller says he believes in splitting. This is really a redundant remark. For anyone who can publish the same species in three different genera at once as he did in his Catalogue of North American plants must be a splitter of splitters, outdoing even Curie the chemist, for the latter only segregated the Radium atom a split from Uranium, but Heller must have gotten far beyond that and found the botanical electrons.

He goes on to say that any name whatever applied to a plant ought to be a specific name. It makes one shudder at what he would inflict on systematic botany if he were to go through Sudworth's catalogue of trees and make specific names of all the

seedsman's varieties and forms there given. But that is not even a beginning to what he would do with the nursery names of herbaceous plants as we find them in seed catalogues. We fear his stock of good Latin would run dry long before he got through. Suppose we take some of the Hellerian possibilities under those conditions. We would have such combinations as this: Malus Redastracanus, Malus pippinus, Malus seek-no-further-us, a very appropriate name which he would do well to follow. Mr. Heller would soon distance Greene who now holds the record with his several hundred species of Eschscholtzia out of a possible valid dozen. And yet Mr. Heller says he only describes species. In view of his statements as to what constitutes a species (anything deserving a name of any kind is a Hellerian species) the botanical public will certainly demand to be shown whether he knows what a species is.

Mr. Heller says that we ought to name everything in sight because it often happens that what a person once considered trivial characters prove by further study to be specific, or some other botanist comes along and proves that the describer of a species lumped several in one. Just so. How about the hundreds of Nuttalian species that further study has shown were fictitious? The same is true of the spurious species of Small, Greene and Gadover in Eriogonum, Greene's species of Eschscholtzia, and Rydberg's Flora of Colorado bristling with fake species. The field botanist who resides where most of these false species grow knows that these men either know nothing about ecology or deliberately ignored fundamental and primary facts in ecology in order to make specific names to which they could attach their own names as authors. It is almost inconceivable that a botanist even with the knowledge that an ordinary boy would pick up in the fields if left to himself does not know that a plant growing in the shade will differ from another of the same species if grown in the sun and will differ in certain well known directions, will differ if grown on a hot or cold slope, a rocky or loamy soil, a well drained or poorly drained soil, and yet if the seeds of these plants are planted the peculiarities will at once disappear if put under other ecological conditions. We must give those men the credit of having ordinary sense, and if we do then the conclusion is inevitable that they made these species for purely personal reasons.

Mr. Heller claims that it is personal abuse to say that the chance of getting one's name attached to the tail of a new botanical

combination is at the bototm of so many new names in American botany. If his statement is true then there must have been some other weighty reason for the coinage of these names due to deep and exhaustive research which has put the botanical public under lasting obligation to these botanical philanthropists. Now what great and exhaustive research led Mr. Heller to publish the same species in three different genera in his Catalogue of North American plants? What deep and exhaustive reason led Mr. Heller to coin the name Astragalus Malheurensis for Rydberg's Astragalus Cusickii when he did not know enough about it to know it was already a synonym for a variety of Astragalus arrectus? What deep and exhaustive research leads Mr. Heller in nearly every issue of Muhlenbergia to make a new batch of names for recently described species which he finds are homonyms by referring to the Kew Index when he does not know whether the proposed species are valid or not, or whether the names given in the Index are nomina nuda or not? Any eighth grade school boy could do as well as that. Does Mr. Heller think that is good botany? If so he stands almost alone. No one denies that he or any other person has a legal right to publish what he likes, but no one has a moral or botanical right to make names for things that he knows nothing about. It is in violation of the fundamental laws of botanical good taste, and is everywhere condemned.

This craze for making new names for plants reminds one of a lot of school boys at a pie counter in a mad scramble for fear they will not get any pie. A sample of this foolish work is in Muhlenbergia 4 56 where Cockerell rushes into print because the Kew Index states that Rafinesque published a Euphorbia montana Am. Month. Mag I 450 (1817), and so he renames the Euphorbia montana of Engelmann, without even referring to the magazine to see if the reference is correct. The fact is there was not only no such species published there, but no plants were mentioned there at all and Rafinesque published nothing of any kind on that page. It is perfectly safe to say that if there had been no chance to get a Cockerell tail on a new botanical name the Kew Index blunder would never have been noticed.

Mr. Heller says that I am objecting to so many new names and yet I do not hesitate to make many myself, and therefore it is a case of the pot calling the kettle black. The logic of this conclusion reminds me of the conundrum "When potatoes are worth fifty cents a bushel how many beans will it take to shingle a meet-

ing house." If Mr. Heller is not able to see the difference between such work as I have criticised above and the results published in my last Contributions he certainly will need the sympathy of the botanical public. The species published there and the suppression of species or reduction of them was the result of a lifetime spent in active work in the field and herbarium, much of the work having been held in abeyance for years after the manuscript was written in order to be sure that as few mistakes as possible were made. I am not objecting to new names, the more the better, if they are based on sound views of specific limitation and exhaustive field research, but I do object and and most other botanists object to the slip-shod and inexcusable work mentioned above.

Mr. Heller is right in saying that there is but one way to determine the validity of a species and that is by thorough field work. I have several times emphasized the same thing in my Contributions, saying of those who claim to be able to settle such things by appealing to their "botanical intuitions" that "no one with either inherited or acquired acumen can settle such questions off hand and that it is pure pedantry to assume it." Greene and Rydberg especially have been addicted to bolstering up fictitious species and genera by reasoning from analogy instead of resting on known facts. Such arguments always get their users into difficulty. I well remember when it was a stock argument among geologists to claim that the climate of the Arctic was Tropical in the early Quaternary because elephants (mastodons) lived there, animals which live only in Tropical climates. Many years afterwards one of these animals was found in a perfect state of preservation imbedded in the ice, and it proved to have very long hair and its stomach was full of Arctic plants which it had eaten, showing that it had its home in a frigid climate where that race of animals flourished, and not Tropical as had been dogmatically assumed. So in plants, field study has demolished many a dogma. The bases on which many species and genera were founded have been proved fictitious. For example the development of stipules in willows has proven fallacious; the drying black of the leaves is due to laziness of collectors. The development of the torus and dissection of the leaves in Eschscholtzia are of little taxonomic value. The development of pappus in Townsendia and Chænactis is largely accidental and not specific always. The development of awns in Oxytheca has small value.

The development of leaves in parts of Eriogonum amounts to little. The development of wings and ribs in the Umbelliferæ has been greatly overestimated taxonomically. The whole tendency of field study has been to reduce and not multiply species. It is true that certain persons after limited field study have proposed the splitting up of many species but it is only in exceptional cases that this has ben sustained by exhaustive field work. Of late the tendency to ignore ecological conditions in the making of specific names has been particularly vicious.

Mr. Heller is right when he says that no one makes or unmakes a species. They either exist in nature or they do not exist at all. The careful field botanist knows that in ninety-five per cent of the cases species have well defined limitations easily recognizable as they grow. The few not easily distinguished are generally due to hybridization with allied species, while a few others such as Astragalus lentiginosus vary so greatly under diverse ecological conditions that nothing but long study can convince the observer that they are variations of one polymorphous species. One of the elements for confusion now is the gratuitous assumption by some botanists that genera and species must not vary beyond a certain amount arbitrarily set by themselves before they become separate species. It has become quite a fad to call these "aggregates" contemptuously with an air of superior wisdom and to proceed to "segregate" them into as many so called species as their limited material allows. Those who follow them when they come to study their own material find that they have a number of new species that do not fit these "segregates" any better than the old species and so they pile up more new names. A good illustration of this is in Greene's treatment of Eschscholtzia. When he first began to dissect this genus he made quite a batch of new names based on the development of the torus. After some years of quiescence he erupted again after finding that he had many more species still undescribed which were fully as good as his former ones. And so he has kept it up for nearly twenty years piling up new names till soon he will have a species for every sheet of specimens in his collection. The same course has been followed by Rydberg in his Flora of Montana and still more in that of Colorado. In like manner several others have made many untenable species in Antennaria, Castilleia, Lappula, Eriogonum, Phlox, Scirpus, Carex, Sitanion, and the Compositæ, etc. In nearly every case these specific names have been made by

people with scanty material without any or with little field experience in the cases cited. During the past season I have made special field studies of such genera as Lupinus, Habenaria, Castilleia, Impatiens, Carex, Salix, Betula, Populus, etc., and find in nearly every case the purported distinctions are fictitious. There is but one great thing that the botanist should keep in mind and that is "What are the facts?" If he starts out with the thought that species is only a name to conceal what never existed and purely a matter of the personal equation then his work has no value. If he starts out with the humble attitude of the student, ready to see what is before his eyes and ready to forego his theories when the facts compel it, then he may do valuable work and not till then. If he starts out with the idea as many have done that the more his name gets in print the greater will be his reputation especially if his name forms the tail to new botanical combinations he will land in Scylla and Carybdis where many are now. Some seem to forget that one's name attached to a fictitious combination is a perpetual advertisement of incompetence. With the most painstaking care we all have too many such advertisements already without adding to them unnecessarily. In this connection a remark by Engelmann many years ago is in point I had been studying Opuntia and had collected material of O. Missouriensis and rutila. I laid it out before him and said, "Now Dr., tell me where Missouriensis ends and rutila begins." He threw up his hands in mock horror and said "I expect I shall have to suffer in Pugatory for making too many species of Cactaceæ," for he could not distinguish the two species. If he were to suffer so in the next world for his errors we would have to resurrect Dante to make a suitable Purgatory for some present day botanists I fear.

The fundamental law in botany which we find everywhere emphasized is that plan life must be in practical harmony with its environment, and climate produces most of this environment. We know geologically that there has been no change in the climate of the World for 10,000 years and probably a much longer time than that. We know geologically that wherever there has been a sudden change of climate the life has changed as suddenly without infinitessimal gradation. Some people seem to act under the assumption that species are changing every day, which is wholly gratuitous, for there is not a single authenticated case known. I have no reference here to the fictitious results claimed to have been produced by artificial conditions. Everyone knows that

these so-called species revert to type when restored to a state of nature, the statements of certain recent botanists to the contrary notwithstanding.

Mr. Heller intimates that the severe criticisms from certain opponents of the Brittonian system of fake species are due to personal jealousies and not to a desire for a better taxonomic system. That there are personal and institutional jealousies no one familiar with recent botany can deny, for anyone who has been at Columbia knows that at least for a time a person could not be there a day without hearing nearly everybody else disastrously dissected, and particularly Harvard men, but a person might be at Harvard a month without ever hearing anyone spoken of disparagingly. This does not prove, however, that Harvard men are not ignoramuses or that Columbia men are not angels, but men who do their own thinking as the writer does will continue to do their own thinking. Mr. Heller might explain what personal jealousy led Dr. Robinson to roast him in the Botanical Gazette in the most caustic terms for publishing the same species in several different genera at once as he did in his Catalogue of North American plants. The probabilities are that Mr. Heller never met Dr. Robinson, and it is a certainty that he never had an altercation with him. Mr. Heller might explain what personal jealousy led Professor Cowles of Chicago to write "The recent ebullitions of the taxonomic radicals have evoked in botanists in general successively dissatisfaction, contempt and rage. These things will not be endured much longer, a little more and the sinning taxonomists will be cast out into the outer darkness where there shall be wailing and gnashing of teeth." If Mr. Heller has ever done anything in a taxonomic way that might cause jealousy in others the writer has missed seeing it.

There are some people who have surrounded themselves with a halo of self adulation so dense that they can never see the difference between fighting them and fighting the truth. They are like a third rate minister the writer once knew who berated his parishioners because they did not feel like going to church to be bored by his inane harangues each Sunday, he called them irreligious, backsliders and told them they were going straight to perdition. He was so pachydermatous that he never discovered the truth and never will. However much dust the fake taxonomists may throw in the air to deceive others as to the real issue they will find that those who are ignoring the most common and well

known facts of ecology and appeal to their inner consciousness, or 'botanical intuitions" as Britton calls it, for justification of their vagaries will find that the taxonomic road is steep, thorny and devious and getting worse for them at every step, while "outer darkness' is just ahead.

So far as the writer personally is concerned he is too busy to spend any time on enemies if he has any. Life is too short to hold grudges against anyone, while the injury to oneself in harboring a grudge is worse than the offense in the first place. The writer is familiar with all the arts and trickery that the wrong side in a controversy uses to accomplish its ends and is not in the least disturbed by the hostility of any man however influential or wealthy, it would not make any difference in his attitude what personal injury might be done him. There is no doubt that most of our difficulties arise from selfish men trying to force their half-baked ideas on the botanical world, but that should not deter men who have spent their lives in searching for the truth from defending it as they know it to be. Whatever is good will stand, and whatever is bad should fall. We should be big enough to abandon any views or pet theories when the evidence is against us. The trouble with many men is that they start out in botanical research crammed with theories and try to twist the world into their little crack.

For about fifteen years the botanical world has kept silence in the matter of fake species-making while it has grown like a mushroom by the hands of its makers. Some opponents have done so under the assumption that the more rope you give a calf the quicker he will hang himself. This is all right in a forest or where there are plenty of obstructions, but on a prairie where there are none it is different. Therefore some botanists have concluded that a few snubbing posts judiciously placed on the prairie would hasten events, hence the cries from the calves.

FLORA OF WASHINGTON.

This ample and rather sumptuous volume on the Washington flora by Professor Piper shows a great deal of careful study. The skeleton keys are very helpful, and seldom poorly constructed, though the skeletonizing of the specific characters is so attenuated as to be of little value in a number of cases where the author missed a permanent character.

The compilation of data under the species is very valuable.

The best part ot the work is the Grasses.

The author has shown considerable independence in the reduction of many Rydbergian species and genera, but has not carried it far enough, particularly among the orchids where Rydberg has erected a spurious genus called Piperia after the author.

A few clerical and tpyographical errors creep in here and there but no more than would be found in any well prepared volume. One page 122 we find Danthonia thermale instead of thermalis. On the same page Danthonia Californica is credited to "1858-62" when it was 1863. On page 127 Melica stricta is left out though placed in the key. On page 147 under Agropyron biflorum we find Agropyron repeated in the line below when it should be Triticum. On page 157 the second Volume of the Botany of California is made to appear in 1876 when it came out in 1880. On page 160 Eleocharis obtusa should be (Willd.) Schultes. On page 165 Carex festucacea var. brevior should be (Dew.) Fernald Proc. Am. Acad. 37 and not as given. On page 167 Carex Douglasii var. laxiflora should be Mem. Torr. Club I 21 instead of 2 20. On page 171 Carex nigricans should have been Mem. Pet. I 210 instead of 211. On page 183 Juncus alpinus var. insignis was published in 1868 instead of 1866. On page 184 Juncus Mertensianus was published in 1833 instead of 1832. On page 187 Allium cernuum should be Rœm. Arch. I 3 instead of I 2. On page 165 Calochortus Lyallii's range is given as Eastern Washington in the Cascades, if that is true the Cascade range has moved since I was there! Etc.

His treatment of the willows does not throw much light on that tangled mess. Nor does his handling of the Betulaceæ give as much light. His unnamed birch is evidently B. pendula. But whether his B. occidentalis is a form of alba or pendula or micro-

phylla is uncertain though it would point to alba. He keeps up Alnus sinuata when it is only a form of crispa, and also keeps tenuifolia separate from incana with which it freely intergrades.

FLORA OF COLORADO.

This handy volume by Rydberg is on the whole the best thing that has ever been printed on the Colorado flora, and cannot fail to be helpful. It shows a great deal of study of limited herbarium material, and in many of careful field study. It is remarkable for its absence of knowledge of some of the most extensive and best collections ever made in the state, and for its imperfect knowledge of the distribution of species in the state.

Mr. Rydberg's critical work seems to be confined to collections accessible to him at Columbia and is and always has been devoid of that large generalization and critical knowledge that he could have obtained at Harvard and Washington, and of the many valuable western collections. His specific limitations of new or rare species seem to have been drawn from single specimens and are always defective.

It is very unfortunate that Mr. Rydberg has become so saturated with the desire for new species and genera that his judgment is warped and he is led to magnify trivial and evanescent characters beyond all reason. This is the great defect of his Flora of Colorado. It fairly bristles with fake species and genera, and yet his keys are remarkably well made and valuable though they are at times misleading. If he could divorce himself from the species making craze his work would be good. There is a steady deterioration in his work since he got out Physalis and Potentilla.

The writer is informed by a personal acquaintance of Mr. Rydberg that he (Rydberg) feels aggrieved that people criticise his many new species and botanical methods since he claims that he is not responsible for them but the Brittonian system requires it. This may be true, but people judge others by the results, and when those results are plainly against all the observed facts in nature the man who produces them must suffer. It is to be hoped that my informant is in error for a man who is so weak as to submit his own judgment to that of another is not liable to have any judgment worth having. We know that botanical bossism is rampant in certain quarters but we had supposed that it confined itself to nomenclature and the selection of subservient men for the work the bosses had at their disposal.

THE ORIGIN AND DISTRIBUTION

of the

FLORA OF THE GREAT PLATEAU.

An Address before the Utah Academy of Sciences.*

In determining the origin of a flora, a person immediately assumes that its geological antecedents will govern its character, which is literally true, but is not true in the broad sense generally assumed.

It is a well known fact that there has been a constant expanding and progression in the flora of the world from simplicity to complexity, and from scarcity to abundance and the reverse: but the old dea of infinitessimal gradation due to Spencerian evolution is a myth. It is true that the term evolution still persists, like the vermiform appendix in man, but it is a misnomer and is improperly used for the involution of today. The word "Spencerian" is used advisedly as he defines evolution clearly.

There is no one fact in geology better established than the sudden appearance of great numbers of new genera and species without infinitessimal gradation, all along through the ages wherever there has been a marked change of climate. The assumption that this is due to incompleteness of the record or to migration is a kind of guesswork that can hardly be called scientific.

Climatic changes are due to celestial or terrestrial agencies, particularly the latter, and the latter are either general or local.

The celestial changes are infinitessimal in gradation, such as the decreased heat from the sun and the procession of the equinoxes. The latter is assumed to have caused the alternations of ice caps at the north and south poles, and also the glacial period. This precession must have made great changes if its effects were anything like what have been attributed to it. It is very probable and practically established that alternating ice caps have been so produced, but it is almost a certainty that it did not cause the glacial period, for this period did not reach its climax one hundred and twenty thousand years ago as the precession theory demands,

*The body of this paper was written in 1895, but has been withheld pending a complete examination of the species of the Great Plateau.

for, at least, the latter part of it was still in existence less than ten thousand years ago, long after the precession theory would have required the disappearance of the ice age. So whatever effect precession has had, it has been obscured so as not to be traceable in the vegetation of today. It must be conceded, however, that though precession would have had no effect on the vegetation of the Tropics, it would have caused a frigid and temperate climate over the northern and middle portions of the northern hemisphere while the ice cap was at the north pole, and would have driven the Tropical flora far southward toward the equator, and likewise would have extended the Tropical flora southward from the equator, equally. It should also be remembered that the precessional changes noted, must have occurred in the same way every hundred and twenty thousand years since vegetation began. So these alternations from Tropic to Temperate and Frigid must have occurred through all of the formation of ice caps, at least wherever there was land.

The terrestrial changes in the flora, as I have said, are of two kinds, gradual and paroxysmal.

Gradual changes are those due to a cooling globe and fixation of carbon dioxide gas from the air, in the form of carbon from the vegetation which has been turned into coal, and in hydrocarbons and lime beds which are buried in the earth: also erosion has been gradual. These three causes have almost completely altered the vegetation of the land.

The paroxysmal changes are those due to alteration of the surface of the land, due to earth folds, and are the most important of all in relation to the vegetation of today, while the other changes noted are the most important in geological history.

It is a practical certainty that vegetable life began in the sea at the poles, for that is where the first temperature cool enough for vegetable life would be found. This life gradually extended throughout the ocean of the globe, as soon as the temperature was lowered sufficiently for life to exist, this vegetaion ultimately reaching the equator and being superseded at the poles by other forms of life better adapted to a lower temperature. As the ground emerged from the sea, land forms would appear first near the poles.

The Carboniferous Age, which, compared with today, was very early in the earth's history, was remarkable for the enormous development of land vegetation in quantity which has never been

equaled since, and was remarkable for the vast coal beds deposited then, for its tropical climate, and for the enormous amount of carbon which was removed from the air at that time by the vegetation. Though this vegetation was rankest in the eastern part of our country, there were large areas in Central Utah around the Wasatch and Oquirrh mountains where great forests and swamps abounded at that time.

At the close of this age nearly half of Utah and most of Nevada was elevated above the sea to an apparently great height, but if there was a temperate climate on the highlands, we have no evidence of it, for the remains of vegetable life in those regions could have been preserved only in the sediments of inland lakes and none of them have as yet been discovered. But we do know, that at the elevation of the sea, the climate throughout the whole of the Mesozoic was tropical in Utah, at least, till the beginning of the Tertiary and probably beyond. This condition of things also greatly reduced the carbon in the air and therefore reduced at least the size of plants and increased their capacity for development. During this long stretch of time the vegetation of the earth took on more of the form of today, though still widely different. Looking at the land areas existing at that time, we find the country more like the Grecian archipelago than the land of today, because there were everywhere vast bodies of water and arms of the sea in all directions, which must have made the climate very humid still and precluded the existence of arid vegetation. Eastern Utah itself was still under the sea and the land extended in a long ridge only a few hundred miles wide, from Arizona to Alaska, while an equally narrow strip in central Colorado, surrounded by the sea, also extended toward the pole.

During the Tertiary all was changed. Practically the whole of the Great Plateau from Mexico to the Arctic Circle, and from the plains to the Sierra Nevadas, was bodily lifted high above the sea and had its vast mountain ranges and immense valleys, but the valleys were for the most part filled with great inland lakes or seas of fresh water. But during most of the Tertiary, at least near the sea level, the climate still was tropical throughout our region. However, in the latter portion of the age, we have unmistakable evidence of a temperate climate, though warmer than that of today, and many of the genera of plants now existing abounded around the borders of the lakes, as is proved by their fossil remains in the clay beds, and even some of the willows and cotton-

woods of today fringed their shores. The climate of that age must have been radically different from ours of today, as a whole, because of the presence of the inland seas, which must have caused the humidity to be at saturation point most of the time, and therefore, must have prevented the existence of arid plants. In addition to that, it was a period of great volcanic disturbance and immense lava flows covering thousands of square miles, which must have increased the temperature of the region and also the amount of carbonic acid in the air. It was also an age of mountain making, where the structure of today as we see it, was formed in large part, and where every possible opportunity for the development of vegetable life occurred, from the frigid to the tropical. The seas formed ample means for the distribution of seeds from one mountain range to another, and thus facilitating a uniformity of the vegetation along their shores, while the freshness of the water prevented the destruction of the seeds. During this time there is no doubt that the prototypes of the vegetation of today came into existence throughout our region, so far as a humid climate was concerned.

The close of the Tertiary was marked by the beginning of the Age of Man, by the draining of the great inland seas and probably by a still greater elevation of the land. The seas were doubtless drained mostly by the erosion of their outlets to the level of their beds, so that they all disappeared with a few insignificant exceptions, giving place to small rivers in their stead. This made a great and relatively abrupt change in the climate of the entire region. The humidity rapidly decreased from saturation to very little, and the skies changed from the almost perpetual fogs to bright and sunny and almost cloudless for most of the year, and with the clouds also vanished the vast swamps around the lakes and the solid forests which clad the mountains from base almost to summit, with a mantle of perpetual green. In their places came grassy plains and rugged mountains with scattered trees, and these again gave way to a sodless land of bunch grass and sagebrush and alkali plains and lakes. Utah and Nevada at that time were made of parallel ranges of mountains with broad valleys draining down to the Colorado and the Columbia. Soon after that, volcanic disturbances formed the Great Basin and cut off the drainage to the north and south.

At this time the profound disturbances of the earth's crust toward the north cut off the warm ocean currents from the North

Pole, which had hitherto prevented the excessive cooling around the poles, and thereby made possible the beginning of the Ice Age in America. There were still vast bodies of ocean water at the north, but the lack of opportunity for the rapid intermingling of those waters with the ocean currents of the south, resulted in a rapid cooling of the water in central British America and the formation of a so-called ice cap south of the pole which spread from the Atlantic to the Pacific and which reached its maximum thickness not far north from the British boundary line and was greatly augmented by the humid air from the waters of the sea which extended far up toward Minnesota and occupied a large portion of the lower Mississippi Valley. The cooling effect of this great ice cap and the glacier streams flowing from it, produced immense glaciers throughout Montana and Idaho, and smaller ones throughout the mountains of Utah, Nevada, and Colorado.

The climatic effects of the glaciation became profound and the temperate climate and its vegetation were driven so far southward that it was only found in northern Mexico and adjacent Arizona, and in its place in the valleys, came the climate and vegetation of the Arctic Circle or the Frigid climate as we call it now, while the mountains themselves throughout the Great Plateau were covered with a mantle of perpetual snow, at least to northern Arizona. The Great Basin then filled up largely with two great lakes called Lahontan and Bonneville, of which Pyramid and Walker Lake and Carson Sink now represent the one, and Great Salt Lake the other.

As the access of the ocean currents to the North Pole was still farther cut off and the Arctic lands emerged from the sea, and the great Mississippi Valley sea retreated far to the southward, the great ice cap of British America lost its supply of moisture and ceased to grow and then gradually dwindled away till it finally disappeared. So also the snows and glaciers faded away from the mountain chains, and the ice sheet retreated northward far into Alaska, taking with it its Arctic climate and drawing after it the old Temperate climate and its vegetation, which prevailed before the time of the Ice Age. As the climate changed to temperate, so the temperate plants crept up along the valleys of Arizona, climbing the mountains and the rim of the Great Basin, and slowly displaced the dying vegetation of the Frigid invaders, till it spread out over all the valleys and possessed the land from the Colorado to the Yukon, and as the climate still grew milder, the temperate

plants climbed the mountains and possessed their lower slopes as well as the valleys.

The Frigid plants which once abounded throughout the Great Plateau, were for the most part unable to endure the increasing warmth and so died out in the valleys and gradually climbed the mountains, taking the place of the melting snows; and following close at their heels came the Temperate plants. The steady increase of the Temperate climate has finally driven the snows away, and the Arctic plants have climbed the mountains and now possess only the lofty peaks of the higher ranges, which are separated many miles from one another, but still have practically the same vegetation wherever a mountain peak has a Frigid climate from Nevada to Colorado or from Arizona to British America though many of the Arctic plants have been exterminated from the high peaks to the southward. Out of all the wealth of Arctic plants which once occupied our region, Utah still holds only a hundred or so and many of them are different species though belonging to the same genera. The only remnant of the Frigid flora we now have in the valleys of the Great Plateau is found in the flowers of early spring which bloom quickly, bear fruit and die away. Of such plants are Orogenia, Claytonia, and the sand lily, some onions, the sego, most of the phloxes, the yampa, the Fritillaria, many of the buttercups, and some others.

As the Temperate plants displaced the Arctic plants in the Great Basin and northward, so the Tropical plants have displaced the Temperate ones in all the region south of the Great Basin. A few of the Tropical plants, particularly annuals, have even invaded the Great Basin as far north as Salt Lake City, though they are very few and only represent the hardier outliers of the Tropical life zone. As none of the Great Plateau within the Tropical life zone has a humid climate, we find no plants growing naturally which are commonly classed as Tropical. It is interesting to try to trace back the origin of this Tropical arid flora from that of the humid Tropical as commonly understood. The descendants of the former Tropical seacoast appear to the botanist more as botanical monstrosities than as real descendants of those magnificent plants. Of all the six or seven thousand vegetable forms, there is but one descendant of this flora left, namely, the California desert palm, which abounds on the eastern base of the Sierra Nevadas. Of the botanical caricatures which are remotely descended from the same stock and which dot the deserts of the South like the dead

U. OF ILL. LIB.

and dying trunks in a burned over forest, there is none so interesting or peculiar as the Joshua and the Yuccas, of which there are many kinds. They stand out in the desert like scarecrows with their great bayonet leaves, sometimes three feet long, sticking out in swabs at the ends of the stems, or like needles in a pincushion from the ground, as though protesting mutely at being compelled to exist in such a region as that. These descendants of the old Tropical flora are few in proportion to the main vegetation, but are quite different from the typical desert flora.

It is a botanical axiom that the vegetation of a region is in harmony with its environment, or in other words, the plants are so constructed that they can exist and even thrive under the climatic conditions in which they are found. This leads us to the subject of life zones.

LIFE ZONES.

It has been noticed by all acute travellers, doubtless since the beginning of man, that different climates have different vegetation. This is particularly noticeable to all mountain climbers within the Tropics. When this subject first became known through any publication, no one seems to be able to state. The first definite statement of wide circulation and general acceptance was probably that of Humboldt about the beginning of the last century. From the tops of the lofty mountains of Mexico there dawned upon him with tremendous force the fact of life zones, as looking from those peaks he could see at his feet the Alpine flora, and farther down at middle elevations, the vast forests and waving plains of the Temperate flora, and far down near the sea, the palms, bananas and oranges of the Tropical flora. This led him to classify vegetation into Tierra fria, Tierra temperada, and Tierra caliente. This same idea was further expanded when applied to the globe as a whole, and has received universal acceptance, into the Tropical, Temperate, and Frigid life zones, the fundamental idea underlying it all being that of temperature. From a botanical point of view this classification has one element of error, as is shown by an exhaustive study of the vegetation, and that is, the Frigid does not deserve to be classed as a life zone, because its plant life differs but little from that of the Temperate, though the physical and visible effects are very noticeable. There are then but two great life zones, the Tropical and the Temperate. An exhaustive ex-

amination of the vegetation determines this fact with absolute certainty which will be shown later by diagrams. A common error into which many have fallen, has led to a serious misconception of life zones by the failure to recognize the effect of humidity on the climate. Hitherto the Tropical life zone has generally been supposed to be confined to that portion of the earth's surface bounded by the Tropics of Capricorn and Cancer and confined to the humid portion, but a moment's thought will show that the arid portion belongs equally with the humid, though its flora is almost totally different from that of the humid. This fast is also established by the knowledge that you can grow the date palm, oranges and lemons, pomegranates and figs in the arid regions by simply supplying the necessary moisture artificially. This therefore establishes the fact that the climate of Arizona and southern California is truly tropical and that we must not bound the Tropical life zone by the Tropic of Cancer, for that flora extends much farther north.

In 1883 in the Western Galaxy, the writer published an account of the origin of the flora of the Great Basin, giving in other words a general summary of the facts here noted, but claiming no originality for these ideas because as a schoolboy, about 1860, he had studied in Cornell's Geography, these same facts, though he had never had an opportunity to verify them himself till in 1878 when he had stood on the lofty mountains of Colorado and had been profoundly impressed with the same thoughts experienced by Humboldt a century before.

In 1884 a young man in the employ of the Government, Dr. C. Hart Merriam, who was studying the animal life of the San Francisco mountains in Arizona, stood on the lofty San Francisco peak and according to his own statement to me, saw for the first time this magnificent parorama before him and had impressed upon his mind also, most forcibly, the subject of life zones, and so he proceeded later on to elaborate the life zones and give them names of his own, ignoring the work of Humboldt and all his predecessors. He classifies the life of our western region as Sonoran, which he divides into Upper and Lower, Transition, and Boreal. His classification is most remarkable in the manner in which it ignores botanical facts. It was confessedly based on the distribution of animal life, but without knowing much of anything about the vegetable life, he states that the botanical and zoological life zones are identical. Whether his zoological life zones are

correct, I am unable to state from my own knowledge, but in conversation with other zoologists I find that his classification is not generally accepted as accurate. But I do know from an examination of nearly ten thousand different species of plants, which is several times the number of species of animals which he has examined, that his classification is inaccurate. His Sonoran lies half in the Tropics and half in the Temperate life zone. His Transition is a remarkably distinct life zone, showing less transition and a more distinct flora than any other life zone in his classification, and it corresponds to the central portion of the Temperate life zone. His Boreal is equally divided between the Temperate and the Frigid and cannot by any possibility be separated from the Temperate. This will be shown conclusively by my diagrams of the distribution of families, genera and species. It is a generally accepted rule that the first publication of an idea or a name shall be used among scientific men unless it shall be shown to be fundamentally erroneous or inapplicable. Therefore the classification of Humboldt, which has never been improved upon, must take the place of that of Merriam. We therefore have the life zones of the world divided into two grand divisions, Tropical and Temperate. As I have already indicated, the Tropical must be divided into Humid and Arid, and only the latter division is found in our region. The upper temperature limit of this life zone is about 60° annual mean and crosses our region in a very irregular line, following the topography from Albuquerque, New Mexico, to the Salt River Basin, Congress Junction and Kingman, Arizona, thence in a narrow tongue up to and beyond St. George, Southern Utah, and westward through Delamar to Goldfield and Owens Valley, California. All south of that line is tropical; from this tropical base there arise islands, peninsulas and other large areas reaching into the Temperate life zone, represented by isolated mountain peaks and ranges, like the Charleston, Providence, White, Catalinas, Pinals, Huachucas, Santa Ritas, Chiricahuas, Floritas, Sandias and Mogollon mountains and the Great Plateau of the San Francisco region in Arizona; in the latter, the upper division of the Temperate, namely, the Frigid, is represented on the high peaks. The Tropical life zone is chiefly characterized by large numbers of cactus plants, Yuccas, thorny shrubs, and annuals. In our region north of Mexico this life zone is represented by twenty-two families which are found only in that zone, and by seventy-three families which also extend into other zones. The total number of

families existing in our region is 136 and therefore the exclusive families are 16.2% of the whole and the non-exclusive, 50% of the whole. The remarkable distinctness of this life zone shows that it has five times as many exclusive families as any other. The total species in this life zone which are found nowhere else, are 1460, while the species which are found in other life zones are only 250 out of a total of 5910 species in all the life zones. The genera which are found in this life zone and nowhere else are 257, while those which are found in other life zones are 282. The total genera in all the life zones are 1040. The varieties found in this life zone exclusively are 188 and the non-exclusive ones are 28 out of a total number of varieties in all the life zones of 1102.

Comparing the Tropical with the Temperate life zone, we find that the Tropical contains 22 exclusive families, while the Temperate has but 12. The Tropical has 257 exclusive genera and the Temperate 327. The Tropical has 1460 exclusive species and the Temperate, 3461. The Tropical has 188 exclusive varieties and the Temperate, 746.

Of the genera in the Tropical life zone we find that 92 range to the Lower Temperate, 104 to the Middle Temperate, 46 to the Upper Temperate and 28 to the Frigid, out of a total genera of 1040. It should be borne in mind that as a general rule, where a genus ranges from one life zone to the other, the species occurring in the other zone are different, though belonging to the same genus. These species in the Tropical life zone which also occur in the Lower Temperate, are 170, those which range to the Middle Temperate are 31, those which range to the Upper Temperate are 4 and belong only to the lower orders, while none range to the Frigid, out of a total of 5910 species. The varieties which range from the Tropical to the Lower Temperate are 1 and none to the Middle Temperate, 1 to the Upper and none to the Frigid, out of a total of 1102 varieties. The predominant genera which are not exclusive, are 91 in the Tropical and 226 in the Temperate.

The Temperate life zone, of course, occupies all of the line north of the Tropical. It is conveniently divided up into four divisions, which were first published by the writer about 1898 in his Schedules of Zonal Distribution, which were not intended to represent the general conditions throughout the world, but local only. The names to these life zones were given for the characteristic plants which abound in most of those regions. The Tropical was called the Larrea, and the Temperate was divided into four

zones, the Juniper, Deciduous Oak, Spruce and Frigid. In my Geography of Utah, published in 1902, I published the permanent divisions of the Temperate as applicable to the world at large, namely, Lower Temperate, which corresponds to our Juniper, Middle Temperate, corresponding to our Deciduous Oak, Upper Temperate, corresponding to our Spruce, and Frigid, which includes not only the Arctic plants but the Alpine plants as well. The upper temperature limits of the Lower Temperate life zone are approximately 52° annual mean. The upper Middle Temperate limit is approximately 46° annual temperature. The Upper Temperate life zone limit is not much above 32° and the growing period is therefore very short, belonging to the zone above it, the Frigid.

It is practically impossible for the novice and decidedly difficult for the skilled botanist to determine the limits of the life zones experimentally in the field without having some characteristic plant as his guide. This is why both Merriam and myself have used certain plants which are characteristic of certain life zones, as zonal plants, though neither of us originated the idea. Merriam uses the pinon as the zonal plant of his Upper Sonoran, which corresponds to my Lower Temperate; but the pinon is not a good zonal plant for the reason that it is relatively scarce compared with the juniper. I therefore use the juniper as my zonal plant. Merriam has used the Larrea as the zonal plant for his Lower Sonoran, which as I have said is the true Tropical life zone in our region. No better selection than this could be made. In the selection of a zonal plant for the Middle Temperate (Transition of Merriam) the deciduous oak is the most conspicuous, but unfortunately disappears both west and north of the Oquirrh mountains. The spruce and firs are good zonal plants of the Upper Temperate. The Frigid or Alpine life zone includes the subalpine and treeless regions and meadows of the high peaks and Arctic and needs no charcteristic zonal plant.

Beginning then with our zonal plants, we find the Larrea or creosote bush abounds throughout our Tropical region and comes to a sudden stop in a region where the annual temperature is less than 60° Fahrenheit. There will be, of course, mountain ranges whose southern and hot slopes will have the Larrea growing high up on that slope and low down on the northern slope. There will also be places where streams flow down through canons far into the Tropical life zone where temperate plants only grow. A mo-

ment's thought will show even the novice that plants thrive on the particular spots on which they grow according to the climate at that particular spot, and therefore the Larrea must grow high up on a hot slope and will not grow along a stream where the climate is more humid and where cool breezes from above follow down the canon. So these life zone tongues will be found to dovetail into one another wherever there are mountains and canons or large streams. But when their origin is once understood, they need not cause confusion.

It almost never occurs that any zonal plant will stop off suddenly at the upper and lower limit of its own zone. And we must therefore recognize this fact in the use of zonal plants.

The juniper makes an excellent zonal plant for the majority of the Great Plateau, since it begins suddenly near the limit of the Larrea. A better plant still than this so far as the southern limit of the zone is concerned, is the sagebrush, which begins at the upper limit of the Larrea. Whenever either of these two plants is seen growing, the traveller may know that he is entering the Lower Temperate life zone. In southern Arizona, however, the juniper does not occur sufficiently to be of value, but its place is taken by the live oaks, which are as characteristic of the Lower Temperate life zone there as the juniper is in the Great Basin. The upper limit of the Lower Temperate life zone is immediately recognized by the disappearance of the live oaks in Arizona and by the disappearance of the juniper and the appearance of the deciduous oak from Colorado to California. So that wherever the deciduous oak is absent, the limit of the juniper is a good index of the limit of the life zone. The two junipers which must be used as the guide for this zone are the Utah juniper and the California juniper, and they must not be confounded with the red cedar, which is a juniper, or the thick-barked juniper of the San Francisco mountain region in Arizona, which belong to the next upper zone. The Utah juniper is also called the white cedar. The upper limits of the Lower Temperate life zone form a very irregular line skirting around the base of the Rocky Mountains from Cheyenne, Wyoming, to New Mexico, westward to southwestern Colorado and northward to the Book Cliffs and westward to Castle Gate, southward to Fish Lake and the Colob, and northward through the Sevier valley to Salt Lake City and Logan, and northwestward to the Snake River and eastern Oregon, the mountains of western Utah and Nevada forming islands on the Lower Tem-

perate life floor.

The Middle Temperate life zone for the most part forms belts around all our mountain ranges and does not come down into the valleys until we reach Logan and southern Idaho. From there northward into Central Montana, it occupies most of the valleys only and swings around to the northwestward in western Idaho. The deciduous oak disappears generally very irregularly before we reach the upper limit of this zone, but its upper limits can generally be well made out by the beginning of the spruces and firs and by the disappearance of the yellow pine and the sagebrush, which extends from the limit of the Tropical to the beginning of the Upper Temperate life zone.

As I have said, the beginning of the Upper Temperate life zone is represented by the appearance of the spruces and firs and the disappearance of the yellow pine and sagebrush. Throughout the lower portion of the Great Plateau the most conspicuous and valuable tree representing this life zone is the aspen, but in the Montana and Idaho region it is valueless as a zonal plant because it grows low down in the valleys in the Middle Temperate life zone. The upper limit of the Upper Temperate life zone from a botanical point of view, is very poorly defined, but in general it can be used to apply to the limit of trees where the elevation is high, but care should be used in remembering that trees are absent from all ridges on the higher mountains, often a thousand feet or more below the real timber line, while the Alpine meadows and meadows of the Upper Temperate life zone intermingle in a most confusing way so that only those meadows which are manifestly extensions of the treeless region above, should be called Alpine or Frigid.

PLANT FORMATIONS.

Now having given a running summary of the life zones, we naturally come to the subject of plant formations, which are subdivisions of the different life zones caused by local conditions of climate and soil, and modified by barriers. The word plant formation is supposed to apply to a restricted area in which the plant life is substantially the same. This may be due to the condition of the soil, such as the various alkaline formations of which the Salt Lake formation is the most conspicuous, but it is generally due to differences of climate and isolation. For example

isolation is brought about by a flora being separated from another similar one by an entirely different botanical condition. Take for example the densely forested area of the Appalachian Mountains, particularly at the south. That contains doubtless quite a number of trees which would grow in portions of our mountains, and it contains many other plants among herbs which would thrive here if it were not for our isolation. This is brought about by the vast treeless region west of the Missouri river, whose climate is sufficiently different from that of the Appalachians to make it impossible for those plants to grow there. This then becomes a vast barrier over five hundred miles in width, extending from the Great Lakes to the sea, which will effectually prevent plants from going from the Appalachians to the Rocky Mountains unless carried there by animals, which in a state of nature would scarcely be possible, or whose seeds might be carried there by the wind, which is almost an impossibility for anything but the most minute seeds, and an absolute impossibility for seeds of any size. We therefore do not find any plants in the Great Plateau which have come directly from the Appalachians, at least not since the glacial period.

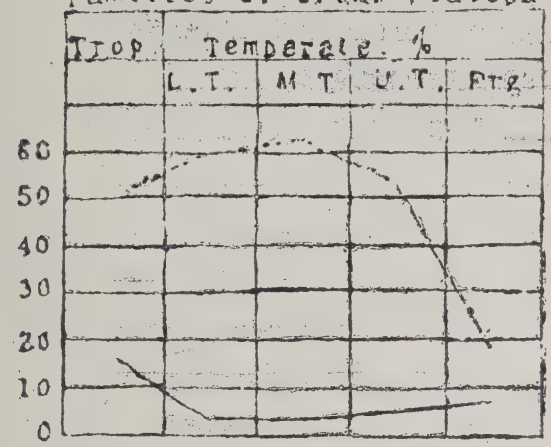
Another kind of barriers is found in the mountain ranges. It is almost a uniform fact that the mountain ranges of the Great Plateau run north and south and parallel to each other and have wide valleys between. These mountains therefore act as barriers to easy progress of plants from east to west or the reverse, because the climate of the mountains is different from the valleys below and therefore valley plants must be carried by the winds or animal agencies, through their seeds, from one valley to the other before they can appear in the valley beyond, and consequently it would be long periods of time before all the valleys of the Great Plateau could in this way intermingle their vegetation till they would have a uniform life, which has never occurred to the present time. The vegetation of the different life zones on the mountains would have to have the seeds blown over the mountains and over the intervening valleys before they would find a congenial soil and climate in the range beyond. This would be less difficult than the transportation of the valley plants from one valley to another, but it still would be fraught with many drawbacks. In this manner we expect to find and do find a decided difference in the vegetation in the valleys as we progress from the plains to the Pacific. For example the vegetation of the Columbia Basin is decidedly different from that of the rest of the Great Plateau. The

vegetation of the Carson Lake region is devoid of many plants growing in the Salt Lake region, and in addition it contains many plants from the Californian region. As we go westward from Salt Lake City we meet the California immigrants one by one. For example Madia sativa has traveled from the Pacific Coast to Salt Lake City and central Montana, but has not yet reached Colorado. Astragalus tetrapterus has traveled from southern Utah and adjacent Arizona northwestward as far as Cobre, Nevada. Astragalus scopulorum has traveled from central Colorado to Thistle, Utah. Many illustrations of the like, both cultivated and native plants, might be given to show the effect of barriers. The influence of barriers is very much obscured by slight differences of climate which have an infinitely greater effect on the plant formation than the barriers. This is well illustrated in the Columbia Basin, whose peculiar flora is due more to an increased humidity than to barriers. Another illustration is the difference in climate between that portion of the Great Plateau east of the Rocky Mountains and that which is west of them. The Colorado climate up to the crest of the mountains, is that of the Mississippi valley, which is characterized by a slight rain and snow fall in the winter and a relatively excessive rainfull during the growing season. The climate of the region west of the Colorado Rocky Mountains is characterized by an excessive rainfall during the winter or resting season and a great deficiency of the rainfall during the growing season, and therefore sections having the same rainfall are strict-arid in the Great Plateau, while in the central Colorado region they are only semi-arid. This is noticeable at once by the fact that you can divide these two areas into the sodded and sodless regions. There is practically no sod west of the Rocky Mountains, while east of the Rocky Mountains the whole region is sodded to the Atlantic Ocean. The plains are characterized by a grassy sod in every direction, while the Great Plateau for the most part has only little tufts of grass here and there scatterd among the sagebrush and similar shrubs which cover the Great Basin. This results in a very great difference in many ways. There are very many more annuals and bulbous plants in our region; it is a region of omnipresent dust and in the hotter portions, of dust and sand. There is also an enormous amount of alkali in almost every portion of the Great Plateau, which affects the vegetation in the valleys particularly. It makes many of the valleys deserts, whose centers contain absolutely no vegetation and whose margins con-

tain only plants suitable for growing in highly alkaline soil. Under these conditions we would expect to find an excessive number of new species and genera on these alkaline plains, but as a matter of fact, we find very few. In all the ages which have passed since the glacial period, but two genera have been produced from Salicornia, which are Spirostachys and Sarcobatus, while the new species are very, very rare. But among the other plants, we find quite a number of new genera which have developed in these isolated regions, and many new species. But it is not in the Great Basin proper where there has been the most production of new species and genera. It is in the hot regions of Arizona and northern New Mexico where the enormous differences in climate of the plains and mountains and the absence of great water courses, and the multitudes of scattered springs or water holes have produced the isolation necessary for the production of new vegetable forms. To go over all the plant formations which have been produced by these conditions, would consume entirely too much time. Practically all these formations were published by me in my Schedule of Zonal Distribution, published 1898. I will only mention a few of the more important formations. Among the alkaline formations the most important are the Salt Lake which covers the old bed of the lake in the Bonneville area, and the Pyramid Lake formation, which extends from Walker Basin on the south to the Malheur on the north, occupying the old Lahontan Basin. Probably the most semi-alkaline formation and the most peculiar of them all is what I have called the Navajo Basin, which occupies that great desert area, whose soil is a peculiarly tenacious clay and is remarkably devoid of vegetation, which extends from the Uinta Mountains to Arizona. Another area but little less interesting is the similar Green River Basin north of the Uintas. A very unique and remarkable region is the lava bed formation extending from Glenn's Ferry to St. Anthony. The lower Snake river formation is also attractive, which extends from Glenn's Ferry to Huntington. These are all interesting valley formations. The Lower Colorado formation is a vast area with a very uniform flora, which embraces Death Valley, the Amargosa Desert, the St. George region, and extends to the Gila and the mouth of the Colorado. Beginning in the vicinity of Tucson, Arizona, and extending eastward to and beyond El Paso and northward to Albuquerque, is what I call the El Paso formation, which covers all those valleys and is characterized by ex-

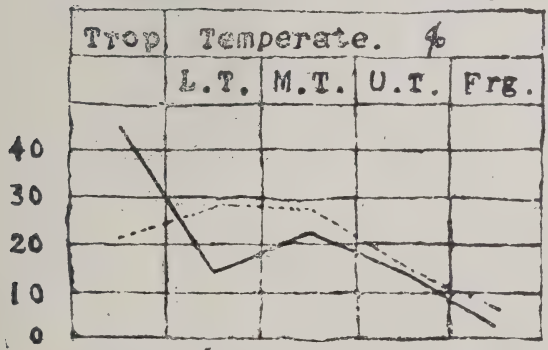
cessive summer rains and a gorgeous vegetation, which is desert until July, but at the first touch of the summer rains, starts into life and reaches its climax in September. These latter are tropical formations. The most important mountain formations are the Colorado formation, the Uinta, the Wasatch, the East Humboldt, the Malheur and the Sierra Nevada formations. The southern formations of most interest are the Kaibab, the Henry Mountains, Funeral Mountains, Panamint Mountains and White Mountains, all belonging to the northern portion, while the central portion is represented by the San Francisco Mountains and the Mogollons and Sandias, while the southern portion is represented by the Pinals, Catalinas, Huachucas, Santa Ritas, Floritas, Chiricahuas, and the Sierra Madres of Northern Mexico.

Families of Great Plateau



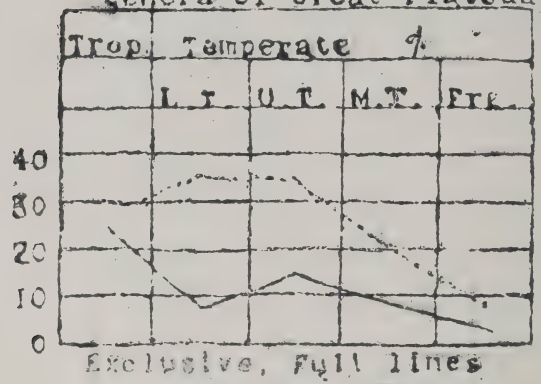
Exclusive, Full lines.
Not exclusive, Dotted.

Genera of Dicotyledons.



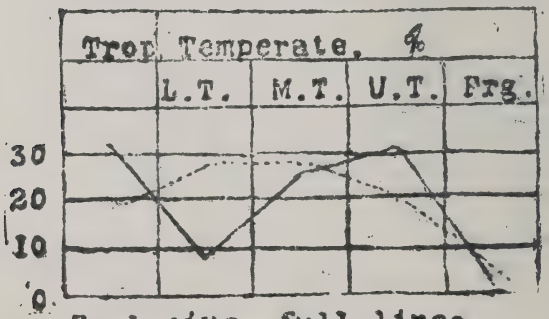
Exclusive, full lines.
Not exclusive, dotted.

Genera of Great Plateau.



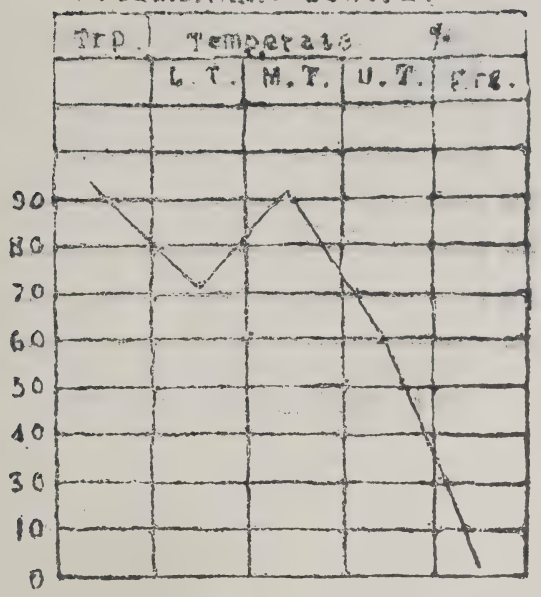
Exclusive, full lines
Not exclusive. Dotted.

Genera of Monocotyledons.

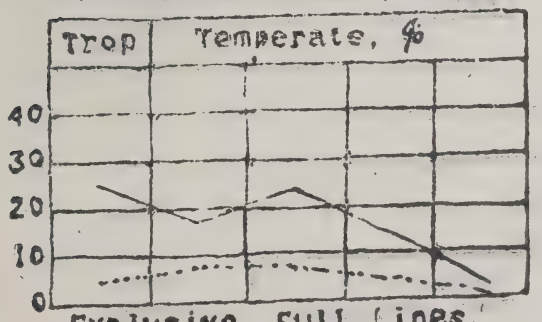


Exclusive, full lines.
Not exclusive, dotted.

Predominant genera.

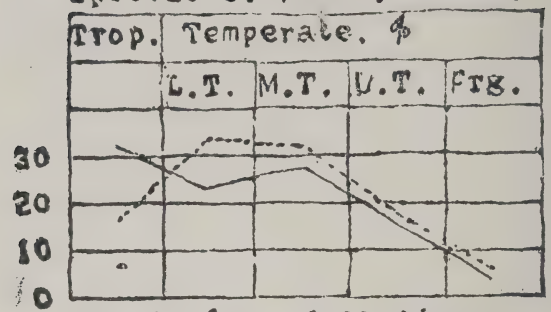


Species of Great Plateau.



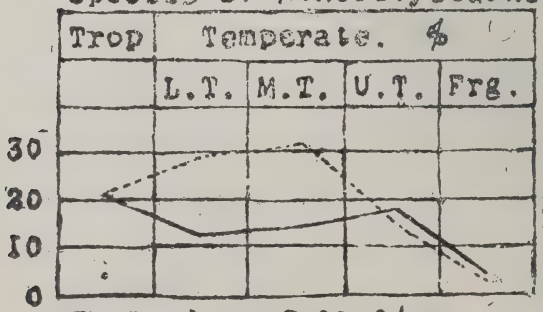
Exclusive Full Lines.
Not exclusive, Dotted.

Species of Dicotyledons.



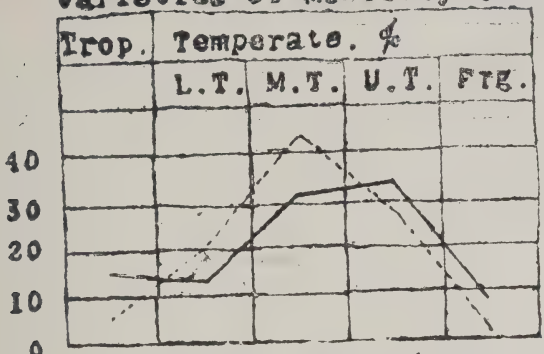
Exclusive, full lines
Not exclusive dotted

Species of Monocotyledons.



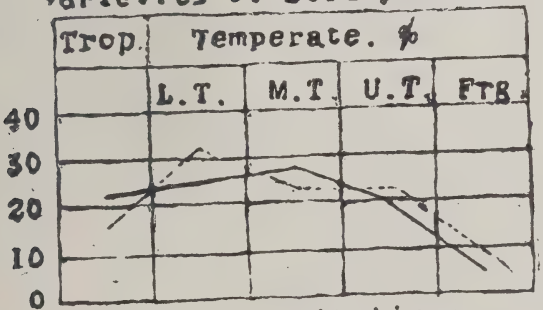
Exclusive, full lines.
Not exclusive, dotted.

Varieties of Monocotyledons



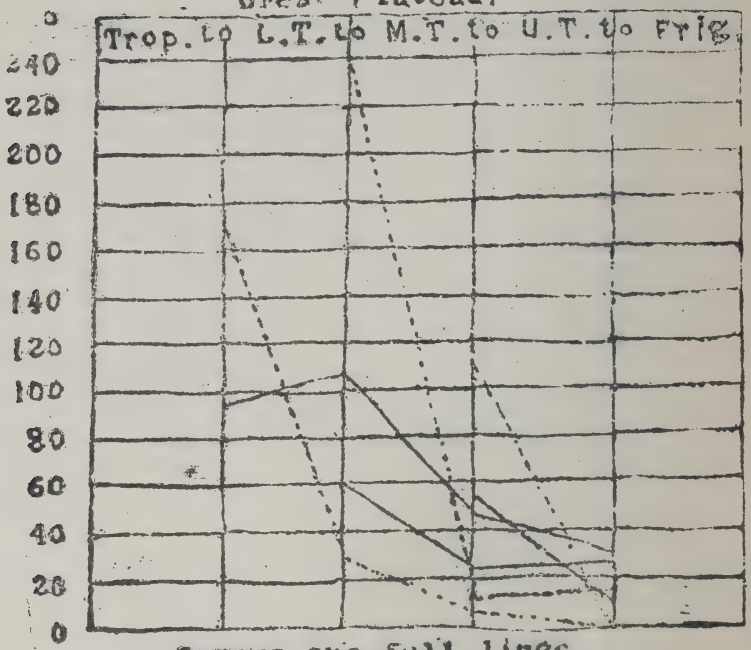
Exclusive, full lines.
Not exclusive, dotted.

Varieties of Dicotyledons.



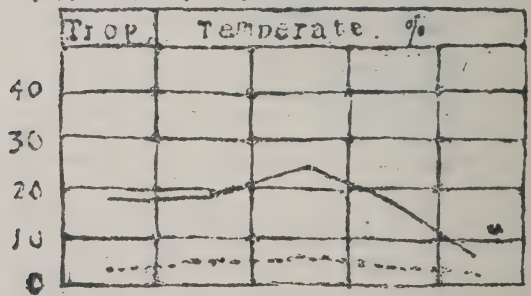
Exclusive, full lines.
Not exclusive, dotted.

Range of Plants
Great Plateau.



Genera are full lines.
Species are dotted lines.

Varieties of Great Plateau.



Exclusive, full lines.
Not exclusive, Dotted

LUPINUS.

In two recent numbers of Muhlenbergia Mr. Heller begins his onslaught on this inoffensive genus, in his characteristic Hellerian way by trying to name everything in sight, apparently following his old statement that any name (varietal, subvarietal, form or otherwise) for a plant should be a specific one, and yet he assumes that his proposed species are comparable with reputable species. He takes up characters long proven fallacious and uses them as specific ones such as size and color of flower, length of peduncle, variation in depth of sinus in calyx, variability in shape of bracts, shape of banner, etc. One would suppose that a person having spent even one season in the arid region would know that the development of flowers and peduncles is governed by the humidity and sunshine during the period of blooming, and that dry seasons make material differences from wet seasons. But all these things go for naught with Mr. Heller. Even plants from the same seed growing together are different species to him, if one has a slight variation from the other. Lupinus brevicaulis is the chief center of his attack this time, though he also goes a little with L. malacophyllus without apparently mentioning its chief characteristic. His work shows a particular lack of material and fully warrants the refusal of some botanists to allow the use of their herbaria for such crude work.

Pentstemon Eatoni var undosus Jones. 1895.
P. **coccinatus** Rydberg, Dec. 1909.

The writer fails to see how Mr. Rydberg can escape the guilt of deliberate and intentional injustice and botanical piracy in publishing his species as he quotes my variety as a synonym of his species and he knows that it is the oldest name and not preoccupied. Heretofore he has been a great stickler for priority and has made many changes of specific names because of previous varieties antedating them. For twenty-five years it has been the rule in America to adopt varietal names when raised to specific rank. It would take a Philadelphia lawyer to keep track of the kaleidoscopic changes of front of certain botanists on nomenclature. If

the Brittonian nomenclature has been at last interred for good would it not be a bright idea to send out invitations to the obsequies, or is the funeral to be strictly private?

It is a fitting end to a system (professedly founded on rectifying the injustice to botanists who first described varieties or species and being robbed of the credit by the transfer to a species or other genus according to the Candollean rules) that it should degenerate to bald botanical piracy. Rydberg repudiates the very system under which he has trained so long (after making about as many changes as were possible under it) and seems to adopt such part of the Vienna rules as suits him in order to make a new name. If anyone were seeking evidence of the personal character of Rydberg's work that it is governed more by petty spites than scientific knowledge this would be ample evidence.

In the same number (Torrey Bulletin for December) which came to hand after the rest of this paper was printed Rydberg illustrates the point made by me above that when you pass the true specific limit in any case and make species out of variations the only limit thereafter is chaos, for intergrades of all sorts abound and to be consistent the maker of these fake species must continue to make species out of every possible variation between his so-called species till they are legion, and every new batch of species requires still more, ad infinitum. As the writer has already shown in previous Contributions Rydberg's and Greene's work on Mertensia is untenable, and so in the latest Bulletin Rydberg is compelled to make a new batch of Mertensia intergrades between the former species and of course has to give them new names for they are as good species as any he has described, and none of them are any good. Fortunately some of these are from material collected by myself and my boys (F. E. Leonard, etc.) of the old Agassiz club, when we were on our botanical trips about Salt Lake City in the later eighties.

A FLORA OF CALIFORNIA,
by W. L. Jepson.

This beginning of the California Flora is out in two parts, dealing with the Coniferæ and willow family, birches, oaks, walnuts, wax myrtles and nettles.

From the manner in which they are gotten out it would seem that they are intended more as advertisers, advance sheets, than as parts of a flora. There is nothing to tell how many parts there are to be or what is the ultimate cost of the completed flora. This follows the bad precedent of the German books, and most foreign works that run up so high as to be almost prohibitive in the end. In order to get at the approximate final cost of this work if completed as planned we find that the two numbers issued cost $1.70 for 64 pp. These 64 pp. are equal to 41 pp. of Watson's Flora of California and therefore the Jepson Flora when complete will cover about 1735 pp. which cannot be contained in less than two volumes and without being bound will cost $47.25 or bound in proper form about $49 to $52 a cost out of all proportion to the value of the work and out of the reach of a majority of botanists. How Mr. Jepson can finish this work as planned must be an enigma to all except himself, and how he can ever be reimbursed for the outlay is also an enigma. It is, in the judgment of the writer, wrong to publish a work in this way for many people unable to buy will subscribe for it without counting the final cost and it will work great hardship on them.

The book is evidently planned on the style of Watson's superb work that will ever stand as a monument to Watson's genius. It is an improvement on that work in many particulars. There are many engravings that can hardly be improved upon in fineness of execution and printing. The heliotype reproductions of photographs are artistically selected. The typographical work is of the highest order and the proof reading excellent.

In the matter of nomenclature the author follows the sensible method approved by the best botanists. He rejects the silly Brittonian dictum "once a synonym always a synonym," and appears to approve of the Vienna rules as a whole.

His conception of specific limitation is sound and in accordance with the results of field study. His conception of generic

limitation is equally good, so far as one can judge by the limited genera given. He adds his peculiar method of inserting forms which has many advantages and is harmless even when not beneficial.

His citations of original place and time of publication and type localities are excellent, and he follows a sensible rule in omitting a multitude of citations, giving only the most essential.

His work is devoid of the stilted half-breed English so prevalent in the works of Rydberg and Small. Technical terms are seldom used and then only the simplest, the English language is good enough for him and ought to be for any scientific man, the constant interlarding with uncouth Latin and Greek derivatives in the works of men who never had a classical education but came mostly from Agricultural Colleges or scientific courses where the Classics were never studied, always makes one suspicious that these names were culled from some obsolete dictionary and that their users would get tongue tied if they tried to pronounce them. They always remind one of the little three-year-old trying to chop with his grandpa's ax.

His method of single citation follows the old rule and has the advantage of simplicity but in my judgment is a retrogression as it emphasizes the name of the last author to the exclusion of the original author who in fact deserves the most credit, but no system of citation possible would do justice to all who have been responsible for the correct names of all plants.

The chief defect in the work is the total lack of antithetical arrangement and condensation. There is a skeleton key at the beginning which is good but outside of that there is nothing. The student has to wade through line after line of matter that is the same in related species. If the work were properly keyed and grouped so that not over three species were ever kept in the same group and all common characters were put in the keys and nothing in the description of the species except what was peculiar to it there would be no duplication and there would be great condensation without the loss of any essential.

In the recognition of varieties there is great variation. Salix longifolia is given with only a single variety while they are legion, while S. Sitchensis has a number of forms, all but one of Jepson's creation. S. Sitchensis var. angustifolia is not properly placed and probably grades into S. pellita. Salix flavescens is S. Scouler-

iana an older name. Salix Lemmoni is credited to the Wasatch mountains Utah when it does not grow within two hundred miles of them. Mr. Jepson evidently does not know that the Wasatch mountains end at Nephi, Utah. Betula occidentalis is given as a good species and B. fontinalis is referred to it, while occidentalis is almost certainly a variety of alba and fontinalis is a form of microphylla.

Salix Monica Watson is kept up though it is not considered a species. Salix Nevadensis is ignored though it reaches the region he covers.

He omits all mention of Populus Fremonti var. Wislizeni (which may be P. Mexicana) though it is the common form of Southern California.

In the matter of specific description there is not great evidence of extensive field work, the descriptions are for the most part copied. In Salix longifolia the most remarkable character is omitted, namely blooming throughout the season, which is not characteristic of any other willow. In Pinus monticola the chief character of the bark is not given at all, namely the oak-like method of cracking into rectangular and small areas. It is only the young trees or small ones that have the smooth bark. In the keys to the monticola group no mention is made of the peculiar character of the cones, their lightness and softness, and the same is true of the Coulteri group where the cones are immense and rigid and excessively heavy. The peculiar glaucous and airy foliage of monticola is not given, nor the soft and punk-like wood and the very resinous bark of the group. Many other characteristic things among the pines are omitted in like manner that would identify them at once which shows lack of keen field study. In the description of Pinus monophylla he gives the needles as one in a place when they are frequently two in a place. He repeats the stock blunder about Tsuga Mertensiana being in Montana and which Blankenship, Rydberg and Sargent have also made, not knowing that it is not found there at all but the cones of Picea Columbiana have been mistaken for it by some one who did not know the difference between a hemlock and a spruce. The writer doubts the correctness of his treatment of Cupressus.

Cupressus species found about San Diego are not mentioned.

He does not mention the fact that the writer of this regards Pinus monophylla as a variety of P. edulis, and that other botanists have gone a step farther and united both with P. cembroides

which is probably better still.

Among the oaks one new species is Q. durata which is Engelmann's Q. dumosa var. bullata. Quercus MacDougali and its variety elegans are not mentioned. Quercus agrifolia var. frutescens is common about San Francisco and Tamalpais and is not mentioned. Quercus Palmeri was never described as a species but as a subspecies in the varietal sense and yet he recognizes it as a species and ignores the older name Q. Dunnii Kellogg. The familiar chestnut oak is put into Pasania a separate genus though all but the Pflanzenfamilien still keep it in Quercus. The author seems to be a little muddled on pp. 357 and 359 where he says (under Q. Sadleriana) "teste spm. in Herb. Royal Botanic Garden Edinburgh, W. L. B," and (under Q. chrysolepis) "while none of Robert Brown's oak specimens were found by the writer either at Edinburgh or Kew herbaria, Brown ticketed a Jeffrey specimen of Q. chrysolepis at Edinburgh as oblongifolia Torr." Now did he or didn't he see Q. Sadleriana and Q. chrysolepis at Edinburgh?

The author makes nearly twenty new "formas," several new varieties, and three new species, all of them with parenthetical Latin descriptions which are assumed to be his own manufacture but internal evidence shows that they were written by some one who was not familiar with botanical terms.

There is one thing that the writer very much regrets to see and that in his reference, on page 342, to Miss Eastwood, who has done many times the amount of unselfish work on the Californian flora that Mr. Jepson has done. The writer most emphatically disagrees with Miss Eastwood's conception of species, but she is honest and a lady always, and this spiteful, jealous slur is too characteristic of Mr. Jepson's treatment of people who have the misfortune to work in the same field. When one is reviewing the work of another it is proper to analyze his motives and methods and reliability but in a work intended to be standard if the work of another is ragged or poor it should be ignored.

Another bad feature of his work is that he refuses permission to see the types of his new species.

Mr. Jepson is not as well equipped for such a work in field experience as Mrs. Brandegee, Miss Eastwood, Prof. Hall, or the scholarly Parish. The writer had hoped that Mrs. Brandegee could be prevailed upon to crown her Californian work by publishing a suitable flora of the state such as

no other botanist could do, for she is in every way best fitted to do such a work justice, but failing in that the field is open for others. The writer hopes that Mr. Jepson may successfully complete the herculean task he has assumed, and that before it is too late he may modify his methods and improve the quality of his work and let others labor alongside of him without friction. The work can never become a school manual because of its bulk and cost. There will be a clear field for Prof. Hall or some other botanist to supply that crying need of a handy and compact school book on Californian botany.

The writer is puzzled by two things, the constant reference to the collections of the author and the almost complete ignoring of those of others especially Miss Eastwood, Mrs. Brandegee, etc., and the constant reference to Jepson's little Flora and the almost constant ignoring of the great Flora by Watson. Whether the author is using his own collections to the exclusion of others in his class work and his own little Flora to the exclusion of that of Watson in his teaching or whether he considers them paramount is not stated, but one would suppose that a great work costing $49 to $52 would have space to refer to the collections of all botanists and to the publications of all his predecessors. If this is his real plan for the whole book and the enormous amount of botanical work done in the state by others is to be ignored then the book might as well be thrown in the scrap heap at once. The writer of this has himself collected nearly two thousand species in the state alone, and his collections contain several score of types of new species. Mrs. Brandegee and Miss Eastwood have doubtless collected still more, also Parish, Hall, Bolander, Lemmon, etc. In addition to the ignoring of Watson's Flora we find no mention of Greene's Flora Fran. and Botany of the Bay region, Abram's Flora of Los Angeles, and Ball's work on the willows.

The work is of course not free from typographical errors such as Salix glauca L. (1853) instead of (1753).

The author's conception of the meaning of botanical terms might be improved both in this and his little Flora. Samples are "circumscissile, splitting at the middle;" "glandular, bearing glands or having a surface which exudes a sticky or viscid liquid;" "habit, general aspect or hue of a plant;" "lenticular, shaped like a lens;" "loculicidal, a capsule splitting longitudinally into the backs of the cells;" "indument, with a close pubescence or coat of hairs;" "nate, a termination meaning divided;" "nigrescent, be-

coming blackened;" "pedicellate, having or possessing a small or short pedicel;" "personate, when the bilabiate has a very prominent palate or elevation in the throat;" "posterior, the side behind;" "pustulate, dilated;" "repand, with slightly uneven margin;" "revolute, rolled backward from each side;" "rostrate, with a beak or spur;" "septicidal, a capsule splitting between the partitions of the cells;" "series, successive rows;" "spadix, a spike with a fleshy axis;" "silique, a 2-celled capsule;" "terete, round;" "turgid, distended or inflated;" "umbel, branches nearly equal and proceeding from the same point, so as to form a flat-topped cluster;" these are only a few samples. Many others leave out some necessary point, or include something that narrows the meaning too much. There are many terms in the text like albumen, anatropous, cucullate, epicarp, indulplicate, retrorse, testa, etc., which he does not define at all but he goes to considerable length to explain such terms as commonly, mostly, Coast Range, interior, etc.

The figures in the text have one defect in that they are either photographs whose value is more ecological than taxonomic, or they are copies from other works and are therefore well known already.

The announcement on the cover that the papers are for sale naturally leads to the conclusion that he intends to make the pupils attending his classes purchase them, a course which made Jepson's little Flora financially successful.

GENERA AND SPECIES.

In the foregoing pages the writer has incidentally referred to the conception of species and genera exemplified in certain recent works. Under this head he proposes to speak of the subject from two points of view, bibliographical and taxonomic.

Names of plants were originally given to groups of plants like the plums, cherries, strawberries, raspberries, etc., in the vernacular, and each publication had a different name according to the language in which it was published. When the Latin became the language of the Courts and later of the scientific world its names were commonly accepted by scientists as common means of identification. It soon became necessary to separate still farther which was at first done by short descriptions which in the end simmered down to the first word of the description or some prominent word in it, this was some time before the work of Linnæus and about the time of the general adoption of binomials for persons. Linnæus who was called by his contemporaries the botanical pirate of his time published his monumental work on genera and species and adopted or rejected the names given by others to plants just as the whim suited him. As time went on names got into a greater and greater tangle from trying to do justice to prelinnæan botanists. It was then agreed by the botanists of the world that absolute priority was an ignis fatuus and that some basis of compromise must be adopted to settle nomenclature. The basis of settlement was that all species published by Linnæus in 1753 should stand as the correct names, and that where two names were published in the same genus the first should stand irrespective of any previous name applied to a plant in some other genus which should be transferred to that genus later, and that should a name prove to be a synonym of some older name that fact should not invalidate a later name like it that might have been applied to a species in the genus. In other words the older name having gone out of existence as a valid one the same name can now be used for another species. This same rule also applied to genera.

In the matter of genera Linnæus's Genera Plantarum was considered the beginning point, or if that did not contain the genus then the Systema was used. In addition no names for genera or species should be recognized except Latin ones. In other words

priority applied up to the year 1753 only. This was a common sense basis of settlement.

In recent years a small coterie of American botanists apparently moved more by institutional jealousy than by any desire to benefit botany have attempted by hook and by crook to devise some method by which to unsettle names and get a chance to rename many species. One of these schemes was trying to adopt priority of a name out of the genus. For example, Astragalus Smithii though it may be the oldest name in the genus must be displaced if there happens to be an Oxytropis Smithii that was published before it in case that the latter proves to be not an Oxytropis but an Astragalus. This gives a chance to make a new name for Astragalus Smithii even if it has been used and is well known all over the world and for many years has been the accepted name. Another scheme for making new names is in the dictum "once a synonym always a synonym" This is simply a device of a lazy bibliographer to get out of keeping track of names, and shows how utterly inconsistent the framers of these schemes are, for if a name for a plant must give way when some other name like it is transferred from some other genus, one would suppose that a name that never was a synonym in its correct genus should stand. Another scheme for making new names is in trying to make out that a genus never was published unless it had a species attached to it. This would invalidate all the Linnæan genera of the Systema and Genera Plantarum not found in the Species Plantarum. It would be just as sensible to invalidate all the Linnæan genera of the Species Plantarum on the ground that no genera were published there. The attempt to adopt these rules has enabled certain men to coin thousands of new names not only without benefitting the botanical world but actually doing it incalculable harm. Another rule has been tried, that of requiring all botanical descriptions to be published in Latin, which is a fearful hardship on our graduates of agricultural and scientific colleges, and is incidentally a still greater infliction on those who have to get sense out of their pigeon-latin. The writer does not favor this rule though it would not be any hardship on him, nor would it be on any of the older men who have had the benefit of a classical education.

Taking up the subject from a taxonomic point of view we find that the Linnæan conception of species was nonintergradation, and the conception of genus was a group of species (or in

some cases single species) that could be better comprehended as a separate entity whose parts were more nearly related than to any others, or sets of groups that formed a composite whole clearly separable from the nearest related groups. We need not consider here the Linnæan conception of the origin of species.

In approaching the conception of species and genus there are at least two points of view, one is the selfish one to see how many groups one can make, or how different he can make things from the accepted names, in order to get his name attached to as many combinations as possible; and the other is how can he best subserve the interests of those who are trying to solve the great problems of genetic relationship and co-ordination for the purpose of finding the ultimate practical value of plants to human life, and for understanding the methods used by the great Force behind it all in adapting plants to their environment of today and throughout geologic time. The former method is unscientific and vicious, the latter is scientific. Another point is one that all taxonomists must recognize, namely, the limitations of the human mind, they must so group their species and genera that they can be readily grasped and held by the average mind. The average mind is not capable of holding more than three things at a time for comparison, very rarely can any botanist hold five and it is almost none at all who can hold seven. This fact has led our best systematists to devise elaborate keys for tracing up genera and species and even families, and this has advanced the study of botany more than anything else. Certain misguided botanists of today have tried to carry this still farther and make one-character keys. This is particularly true of Rydberg's Flora of Colorado, Piper's Flora of Washington and Jepson's Flora of California. This is all well enough when there is one prominent character, but many times a species or genus does not rest on any one character but on a combination of several, and therefore the key is not only worthless but worse than worthless, and wholly misleading from a genetic point of view. For if the key fails then there is no way but to wade through all the species of the genus in order to find the one desired. On the other hand with the keys elaborated as Gray and Watson did them and placed in the body of the genus and not at the beginning, finding the one desired is easy and at the same time the genetic relationship is indicated by the position. Even this is not always possible in a linear arrangement where there are two groups, co-ordinate, branching

off from a common stock, or more, as in Astragalus and most of the larger genera. But this can be allowed for by primary and secondary keys. Not enough attention has been paid to this in the recent books on botany. Gray and Watson made great advances in this direction but their followers have not. Britton copied Gray's keys made out on the basis of putting the highest groups first, then he arranged the families on the basis of the lowest first (following the Pflanzenfamilien), and kept the genera and species in the families on the basis of the highest first! This was about as inconsistent a method as could possibly be devised. The new Gray's Manual has an improvement on this by making a new key and arranging the families in order from the lowest up, but puts at least the species in the reverse order, which is also inconsistent. The new Manual is the only one that does not follow the unwise method of having only skeleton keys and at the beginning.

Taking up the conception of genus as worked out by Torrey, Gray, Watson, Bentham and Hooker, the Pflanzenfamilien, and most modern botanists we find them grouping the species in genera and subgenera in the natural way, the scientific and sensible way, and avoiding the creation of new generic names as far as possible. In some cases they went too far and in others not far enough as some put certain species in one genus and some in another such as shown by thorough research. In scattered cases, debatable ones, species of Aster in Erigeron and the reverse, certain species of Bigelovia in Aplopappus and the reverse, certain in Solidago etc. all due to one systematist emphasizing certain characters to the exclusion of others and other systematists following a different method and getting other results, but in the main they agreed, the policy followed by most of them being to keep all problematical species and subgenera confined to the groups to which they showed the nearest approach. This was carried to the extreme limit in Aplopappus, it being considered far better to hold these loosely aggregated groups in a composite whole than to let them loose in the family to wander unplaced among the Solidaginoid genera without anything to indicate their relationship as Greene and others have done. Under the Grayan method we know where to find them, under Greene's all is chaos. The same is true of changes in other genera such as Astragalus, Oenothera, Ranunculus, the Umbelliferæ, and many others. Most of these changes were made with a great blare of trumpets and claims of superior wis-

dom when in fact none of the men had either the knowledge or acumen or even a small part of that of Gray, but their claims were pure botanical buncomb, to deceive the minds of the uninitiated. When we come to examine the proposed new genera we find them in nearly every case clearly defined a generation ago by others as groups or subgenera, or in some of the recent discoveries were so recognized by Gray or Watson. We know the motive in many cases is not at all taxonomic but purely the result of institutional or personal jealousy or pique. The most prominent of all these men has openly stated that he would devote the rest of his life to undoing the work of Gray, and all on account of offended personal vanity. There is no doubt about the undoing but it has not been the work of Gray that has been undone. Now when we know that the men who are the loudest in their demonstrations against the Grayan conception of genus and species are the very ones at the bottom of the greatest institutional and personal jealousies and who have used unworthy and improper means in the propagation of their ideas the botanical public must be excused if it fails to take such people at their face value, and demands other and sounder views on generic and specific limitation. The revolt against this is wide spread and increasing daily, for every unbiased man knows that it is unscientific. In the matter of priority in nomenclature many a well meaning man has been misled by this specious plea and yet I have shown that if consistently followed it ends in chaos. If we are to have stable names we must adopt a certain date and then make liberal exceptions to even that so as to keep up large genera that might be affected, and this is the method of the Vienna Congress. But even then too many concessions were made to the noisy ones in the adoption of priority out of the genus and the use of the Latin language as a means of publication.

If we take up certain genera we find our attitude varied according to our interpretation of the importance of certain characters, and this variability is due to ignorance of the conditions under which the plants grow, particularly aridity, alkalinity, and high temperatures. This is more noticeable among species. Let us take up a few cases of genera. Among the Coniferæ we find Engelmann, Small and Rydberg working. Engelmann was a man of ripe experience, wide travel, and keen judgment who had studied all the plants from germination to maturity and in their habitat. Opposed to him are two young men with very little ex-

perience, little travel, and poor judgment but who do not hesitate to throw Engelmann's work in the ash heap. Pinus, a well defined genus remarkably distinct from any other they split up into Pinus, Caryopitys, and Apinus, and on what grounds? Do we find any of the great characteristics of Pinus given? None at all. Pinus according to them rests on a long wing to the seed and adnate to it, and a prickle to the scales. Caryopitys rests on a small wing adnate to the scale and a prickle (nothing said about the few and small cones with only a rudiment of a prickle, large seeds, stunted habit and habitat which are the only grounds on which the genus could possibly be founded). Apinus is founded on a small or rudimentary wing and no prickle (nothing said about the long, soft cones with large seeds). Now suppose we were to apply this "scientific method" to the common cat. In the beginning he would be pure cat, but if he met a dog which bit off a piece of his tail he would be catera, if the blood oozing out of his tail happened to stick it to his leg then he would be caterella, and if he got his tail all chewed off he would be catacauda. Let us take up Rydberg's handling of Juniperus. He confines it to J. communis which he splits up into two species, and he makes the genus Sabina out of the rest. He of course cannot rest the genus on the well known berry and leaf character, but instead of that raises this character to the rank of a family which he calls the Juniperaceæ! So he rests Juniperus on the channeled and awl-shaped and not appressed leaves and sessile berry, and Sabina on the pediceled berry and scale-like and appressed leaves. Now whenever the Virginian juniper grows in moist soil and shaded places and develops the awl-shaped leaves it is a Juniperus, but when it grows in drier soil and has only the scale-like leaves it is no longer a juniper but Sabina, but Rydberg does not say what it is when it has both kinds of leaves on the same plant as is commonly the case, and has pedicels varying from nothing to evident. When our Utah juniper which he calls Sabina first starts and for some years after has only the awl-shaped leaves it is forsooth a Juniperus, but when it is mature and has only scale-like leaves it changes its name and becomes Sabina like the girl that gets married. This is just a sample of Rydberg's treatment of genera all through his Flora of Colorado. In previous papers I have shown how absurd is Rydberg's attempt to split up Astragalus.

Now let us take up another class of genus splitters, whose

work consists almost entirely in raising Grayan subdivisions to generic rank. In my review of the treatment of the Umbelliferæ in Contributions No. 12 and above in this paper I have shown the fallacy of splitting up Cymopterus and Cogswellia and the resultant confusion therefrom. In the borages Gray began the work himself by splitting off Plagiobothrys on the one end and Omphalodes on the other from the old Eritrichium, and he followed this up with a too attenuated subdivision of Krynitzkia based on what are now proving to be too trivial fruit characters. This was the signal for Greene to run riot through the genus tossing the fragments right and left and making new species galore, in addition some of the rest of us have not been guiltless, the writer probably among them. Each year that the writer studies this group in the field the more convinced he becomes of the folly of the segregations, for there is no genus character that seems to hold in any of them, there seeming to be a complete transtion, while a clear conception of the family would seem to require the keeping together of all the parts in a composite whole, about as Gray first put it. Another case in point is the treatment of Claytonia. No one ever seems to make any stir about putting annuals and perennials in the same genus, or tuberous and nontuberous rooted plants together, but when it comes to Claytonia it is different though we do not hesitate to keep even shrubby portulacas beside annuals in the same genus. Even Robinson has accepted the division into Oreobroma and Montia and Claytonia. But Rydberg of course carries it to an absurdity by making Crunocallis and Erocallis in addition. The treatment of Ranunculus and Clematis is another case in point, which is adopted by Greene, Rydberg, etc. What for example is gained by making three or four genera out of Clematis by putting the climbers with small white flowers in one genus, the large-flowered lavender-colored ones in another (semiclimbers), and the nonclimbers in another when by keeping them all in one genus we have a well defined unit clearly separable from all others except Pulsatilla which along with Anemone occidentalis might just about as well be put in Clematis, connecting the Douglasii group with Anemone, or be kept up as a connecting link. Every one knows that there is a question as to what we shall do with Pulsatilla, but it only befogs the whole issue and multiplies the confusion to disintegrate Clematis, just as it does only harm to disintegrate Cymopterus and Cogswellia. In Ranunculus the buttercups are well defined, and even a novice

would have no difficulty in placing them, but when the splitters get at them we find the floating aquatilis in Batrachium though it is often creeping late in the season, and the creeping multifidus which is often floating early in the season is placed in Ranunculus. We find the stoloniferous Cymbalaria in Halerpestes and the semi-stoloniferous or creeping repens in Ranunculus. We find the pretty Nuttall's buttercup in Cyrtorrhyncha and its close relatives of the adoneus group in Ranunculus, and so even the expert comes out of it all with his mind befogged so long as he assumes that the splitters have any botanical judgment worth following. In the treatment of Sedum and Cotyledon Britton and Rose have gone to the limit of absurdity, basing their generic characters on things like the leaf-shape and varying adhesion of the carpels which are known to have no permanence. Saxifraga, a loosely aggregated genus though well definable on the whole, is split up beyond all possible recognition and on trivial characters. We find the heucheroid James's saxifrage in Telesonix, the delicate adscendens in Muscaria, the Virginian one in Micranthes and the very different arguta in the same genus, and the yellow saxifrage in Leptasea while the very different bronchialis is in the same genus. All this shows the utter lack of all system and consistency in the subdivision of Saxifraga. Time and space would prevent giving all the unscientific work of this kind from the ferns to the Compositæ.

Taking up the species proposed as segregates from other well known ones we find that here is where the ignorance of some of our eastern botanists is monumental, especially in matters of ecology, and bearing on the effects of aridity, alkalinity and high temperatures combined with low humidity. We find them gravely describing as new species forms of annuals which extend into warmer regions where they survive over sevral seasons and even at times become woody below. We find them making new species out of thin-leaved plants which happen to extend down into places which have a little alkali in the soil which makes the leaves thicker, or which happen to grow in a more arid region and so develop thicker and smaller leaves like Prunus Virginiana which becomes demissa in a drier climate, or which becomes Prunus melanocarpa when its fruit ripens in the normal way. When Ribes lacustre ripens too hastily by being nearly frostbitten and its fruit does not blacken but remains red then it is R. lentum. When the service-berry grows in southern Utah on exposed rocks and is scraggly

and short branched and rigid and with small glaucous and slightly toothed leaves and has a small berry or two it is Amelanchier Utahensis, when it grows in a better soil and develops larger leaves and more berries it has half a dozen names according to whether the leaves have more or less teeth and the petals are larger or smaller, and when it grows still farther north where it has a chance to grow normally it has a new crop of names according to the size of the berries, the shape of the leaves and the petals, till it has more names than a German crown prince, even though every possible transitional form can readily be found between all the species. The handling of this species by botanists is like the treatment a man received from a newspaper that announced his death. He called at the office and demanded a retraction. The editor refused to retract saying that they never made any mistakes, and that all he could do for him was to put him in among the births. This seems to be Greene's method, the intergrading forms come in among the births. Whatever may be our conception of the origin of species it seems to the writer that the only scientific way is to keep recent derivatives in the same group, nothing is gained by raising them to specific rank (except a temporary notoriety of which the author will be heartily ashamed later). Take for example Astragalus lentiginosus. This is the most variable of all Astragali, it has both geographical and ecological varieties which have been described as species to the number of a score or more. There is complete transition between all the forms and the extreme ones are remarkably different from each other. The common form in central Utah Gray called diphysus. It grows in gravelly soil somewhat alkaline, is ascending, rather stout, with narrow flowers, chartaceous 2-celled pods varying from ovate to round and often has a falcate tip. The climate is not hot. As we go northward into Idaho the pods become stiffer but never horny, smaller, more falcate, but the plant has the same axillary and subterminal racemes longer than the leaves. As we go westward into Nevada where the influence of the humidity of the Wasatch is not felt and the rainfall is below eight inches per annum and the humidity less, two forms develop: one with the pods of diphysus but more papery but the same ascending habit and racemes, these forms inhabit the alkaline valleys and gravelly slopes. Around springs in the canons where the soil is moist and somewhat alkaline the plants are prostrate with all the racemes appearing as if axillary by the abortion of the upper ones, and all

shorter than the leaves. The pods are chartaceous and globose, this is my var. ovalis. As we go into sóuthern Utah in the Tropical life zone where it is much hotter we find the diphysus forms with thin pods with a tendency to being narrower and intergarding with the remarkably narrow linear pods of what I once called A. palans and later put as a var. of lentiginosus. When we get into the Lahontan basin commonly known as the Carson sink and its adjacent low areas that run from southern Oregon along the eastern base of the Sierras to beyond Walker lake we find the thin podded diphysus forms on the mesas, the ovalis forms in the canons and another prostrate papery podded form along the alkaline places in the valleys, all apparently intergarding. On the higher mountains westward we find the closely related A. Bolanderi with stipitate pods whose genetic relationship the writer has not yet made out, but which is also related to the arrectus group through A. Weiserensis. When we get on the Death valley slope and particularly in the Owen's valley region and Mojave desert and southward we find other variations, due to the intense heat and greater aridity, to protect the plants from radiation. The prostrate forms are absent except the var. aridus. The pods are mostly chartaceous but when glabrous are papery mostly. The flowers are often very dark-purple while they are normally light-colored; and two forms occur, one with the normal sized ones and one with very small flowers but intergarding. There are two forms as to length of racemes, one has long ones and very conspicuous, the other has short ones and condensed, this latter mostly with smooth pods. The long racemes have two forms one with smooth pods and one with almost woolly pods, this is the var. Fremonti. In nearly all these forms the pubescence of the leaves is conspicuous, in one form it is silvery and the leaves are mostly rather leathery. When we get into the Needles region along the Colorado river these forms are nearly all absent and are replaced by robust forms with large smooth and papery pods in dense racemes. Now to recognize all these multitudes of forms as species will finally land us where Greene and his five hundred species of Eschscholtzia are, in chaos. To consider them all as variations, due to climate and soil, of one polymorphous species makes of them the most interesting and instructive study in ecology and in addition keeps them all together where they belong, and does not confuse either the novice or the expert. This is the writer's view of the way other species should be treated, and it removes the temptation from sel-

fish men to make new names, for there is no glory in reducing species to mere varieties. This method of treatment would reduce by nearly a half the species of Antennaria, Castilleia, Salvia, Lupinus, Senecio, Arabis, Draba, Lepidium, Thlaspi, Erysimum, Delphinium, Aquilegia, Eriogonum, Quercus, Habenaria, Zygadenus, Poa, Festuca, Agropyron, Elymus, Viola and hundreds of others. Geographical varieties would then be the most interesting plants to study, and the tracing out of the causes of these variations would result in the greatest practical good to students of agriculture and horticulture, and to those who are furnishing the food supply of the world. It would also bring systematic botany back to a point of respectability and standing instead of being the scientific laughing stock of the world, as it is now.

Botanical Publications of Marcus E. Jones.

Excursion Botanique, out of print.
Ferns of the West, 30 pp. $.50.
Contributions to Western Botany No. 1, Zoe II 12-17.
Contributions to Western Botany No. 2, Zoe II 336-252. $.25.
Contributions to Western Botany No. 3, Zoe III 283-309. $.25.
Contributions to Western Botany No. 4, Zoe IV 22-54. $.50.
Contributions to Western Botany No. 5, Zoe IV 254-282. $.50.
Contributions to Western Botany No. 6, Zoe IV 366-369. $.25.
Systematic Botany, Zoe IV 374-379.
Contributions to Western Botany No. 7, Proc. Cal. Acad. Ser. 2 Vol. V 611-734. $1.50.
Contributions to Western Botany No. 8 pp. 43. $.50.
Contributions to Western Botany No. 9, Zoe V 41-57. $.25.
Contributions to Western Botany No. 10 pp. 90 and 17 plates. Rev. Allium and Nyctaginaceæ. $1.50.
Contributions to Western Botany No. II pp. 22. $.25.
Contributions to Western Botany No. 12 pp 100. $1.00.
Willow Family of the Great Plateau. $.50.
Contributions to Western Botany No. 13 pp. 87. $1.00
Montana Notes. $1.00

Previous articles published as notes in Botanical Gazette and Bulletin of the Torrey Botanical Club are not included here as they are out of print.

581.979
J72c
no. 14

CONTRIBUTIONS

to

WESTERN BOTANY,

NO. 14.

by

MARCUS E. JONES A. M.

JUL 19 1945

Issued June 29 1912.

BIOLOGY

CONTRIBUTIONS

to

WESTERN BOTANY,

NO. 14.

NEW SPECIES AND NOTES.

Grass Notes

Piper, in his Flora of Washington, gives Danthonia Californica Bol. as Proc. Cal. Acad. 2 182 1858–62. It should be 1863.

On page 127 he gives Melica stricta in the key and leaves it out of the text.

On page 132 he gives Poa leptocoma as published in 1830, but it was 1832.

On the same page he gives Poa Canbyi as his own, when it is Howell Fl. 764.

On page 147 he gives Agropyron Richardsonii as published by Schrader in Shear's Bull. Div. Ag. 4 1897, when it was published in Linnæa 12 467 1838.

On the same page he quotes Agropyron biflorum Brign., when it should be Triticum.

On page 148 he has Triticum caninum var. Gmelini as published in Ledebour's Fl. Ross. pl. 248. There are no plates in that Flora. It should be his Icones.

On page 122 he quotes correctly Scribner's impossible Danthonia thermale, and on page 148 incorrectly quotes Scribner's equally impossible Elymus saxicolus.

Under Melica in the key he has transposed the characters of M. Smithii and M. aristata.

On page 150 he gives Elymus arenarius under grasses without running rootstocks, while it is the reverse.

Sitanion, Elymus and Agropyron he mixes up so much that

no one by following him can tell to which genus certain plants belong. Agropyron saxicola and flexuosum are evidently species of Elymus of the section Sitanion, along with A. Scribneri. Elymus triticoides is evidently a hybrid between E. condensatus and the creeping species of Agropyron, as is shown even by slight field-work.

In the new Gray's Manual, Hitchcock is generally accurate, but on page 168 he gives Hordeum nodosum with awns only 1–1.5 mm. instead of 1–1.5 cm. long.

In going over our western grasses it has required a critical examination of Beal's excellent work, Grasses of North America. Anyone attempting to publish knows how exasperating are his own and the compositor's combined blunders. It is a real service to those who follow to correct them. In this spirit I offer these corrections.

On page 45 he has Andropogon tener with a stipe 3–6 cm. instead of mm. long, and glumes 4–5 cm. instead of mm.

Hilaria is given as published in 1815 when it should be 1816. On page 68 H. cenchroides has spikelets about 5 mm. not 5 cm. long as given.

On page 72 Ægopogon gemmiflorus is given as published in 1815 when it should be 1820.

On page 74 Nazia occidentalis is quoted as having been gathered by me in Colorado, when it should be Arizona It has spike-5–8 cm., not mm. long as given.

On page 93 Paspalum distichum is given as distichium.

On page 102 Eriochloa sericea is given as perennial, which is is very doubtful. On the next page E. punctata is also called perennial, when it is annual.

On page 104 Panicum is given as first published in L. Sp. Pl. when it was in the Systema and later in the Genera. Beal does not follow the Brittonian code.

Under Chamæraphis he says the species are annual, but C. caudata is perennial though blooming the first year.

Under Aristida barbata, page 199, "lateral awns" should be terminal or central, and "central" should be lateral. On page 202 A. Palmeri is given as collected by me in Colorado, when it should be Albuquerque New Mexico. On page 205 A. Americana is given as from Colorado by Orcutt, when it should be the Colorado desert California, which reminds one of Coulter's amusing blunder in his Flora of Texas page 434 where the understudy who wrote it did not know the difference between the Trinity mountains of Texas and those of Nevada, in copying from Watson's revision the descriptions of the two species Allium bisceptrum and A. Neva-

dense referred to there, which do not grow within 1000 miles of Texas.

On page 209 A. grac. is correctly given as published in 1842. the Kew Index errs. On the same page A. divergens has an "arm"

On page 216 Stipa mucronata is given as published in 1815, instead of 1816. On page221 the crown of hairs on S. eminens is given as 5–6 mm. long, which is not correct.

On page 224 Oryzopsis caduca has "the outer glume a little shorter", it should be longer. Lower down the genus is said to have caducous awns, but in O. exigua they are not so. On page 230 O. erecta is given as published in Bot. Gaz. 15 112. but it was published there as O. Pringlei. O. fimbriata, on the next page, was published in 1885, not "1880", and Stipa fimbriata in 1816 not 1815. Its awn is given below as 1.5–2 mm. instead of cm. long.

Under Muhlenbergia the lower glume is given as 1–nerved, when it is often 2–nerved. He gives the upper as having 1–3 nerves, they are often 5. On page 237 No. 24 the word "awn" is omitted, it also should be 1–3 cm., not "mm." long. M. Schaffneri was published in 1885, not 1880. On page 243 M. firma is given leaves 1–15 mm. wide, it should be 1–1.5 mm. On page 247 M Buckleyana should be M. Texana Buckley. On page 257 under M. parviglumis "Brit. Am. 71 1890" is unintelligble. Two lines below lacerate is spelled "lascerate" and many times afterwards elsewhere, On page 261 M. Reverchoni is given as published in 1882, it should be 1892. On page 272 M. Lemmoni has the unintelligible "Brit. Am. 69 1890" again. On page 264 M. implicata should be (Spreng) Trin., not "(Willd) Trin". On page 265 M pauciflora has awns 8–12mm., not "cm" long.

Under Bealia on page 268 the awn should be 1–1.5 cm. long, not "mm".

On page 277 last line of key "9 mm." is an error.

On page 279 Alopecurus Californicus was not published in "1886" but 1888. The same is true of Sporobolus interruptus on page 286.

On page 289 S. "inflatus" should be ligulatus. S. cryptandrus var strictus has stems 10–20 dm., not "cm." long On the page under S. cryptandrus, eighth line, "entire" is an error.

O page 312 Polypogon Monspeliensis was published not as given, but on page 61 as Alopecurus.

On page 345 under Calamagrostis kœlerioides the leaves have a pungent, not "punctate" tip, and the spikelets are 4–5 mm., not cm. long.

On page 363 Deschampsia is given as perennial, but D. dan–

thonioides is annual. On pages 367 and 370 he gives D. danthonioides as a synonym of D. calycina, and yet keeps up both species. On page 368 he lets D. cæspitosa have a panicle only 1–3 cm. long when it should be dm. long.

In the key on page 373 "(i)" should be "(f)". Just below this No. 10 is wholly omitted.

On page 374 Avena deyeuxioides should be of 1816, not 1815. The same is true of A. elongata on the next page.

On page 379 the collector was not the beef extract man, Leibig, but my old friend and acute collector, Leiberg.

On page 397 the last line, "first glume" should be second glume.
and on the next page "second" should be first.

On page 399 Spartina gracilis should be of Trin. Mem. Ac. Pet. (6) 2 110 1840 and not as given.

On page 403 he again copies the common blunder of HBK. Nov. Gen. & Sp. being of 1815 instead of 1816, as to date of actual publication of first part.

On page 404 "musquite" should be mesquit, but is pronounced meskeet.

On page 406 "1815" should be 1816, and on page 410 second line "1880" should be 1885.

On page 413 he spells mesquit "musquit-grass".

On page 415 Bouteloua prostrata is given as of Lag. Variad. Cienc. 2 141, instead of 2 4 141. On page 418 var. ramosa was published in 1890, not 1891. On page 425 the lemma of the misspelled B. Alamosana should be 3-nerved, not 5-nerved. Below it B. aristidoides, as Dinebra, should be Nov. Gen. & Sp. 1 171, and not as given, and the date 1816. The figure on page 427 is probably B. triathera, certainly not B. Texana.

On page 437 Chloris dubia should be 1816, not 1815.

On page 450, under Cathestecum "neutral with a second rudiment in the terminal spikelet" should be erased.

On page 462 where we should find the genus Eremochloe, it is missing, nor is it in the book.

On page 468 1815 should be 1816. On the next page, after Sieglingia albescens the following should be inserted, "Tricuspis albescens Munro Proc. Phil. Acad. 335 1863".

On page 471, two lines above S. mutica, "are identical" should be are not identical. On the page before, second line from bottom "2.5 cm." should be mm.

On page 473, the second line above Dissanthelium, "1–2 mm." should be 3–5 mm., the error arising from changing lines to mm.

On page 482 the punctuation would lead one to refer "1–4 cm. long" to the spikes and not the pedicels to which it belongs. The same error is found under E. tenuis on the next page. On page 484 E. sessilispscata should drop the "ta". D rigida, in the line below, was published in 1885, not "1855" On the next page "E. Neo–Mexicana Vasey ined (?)" should be Coulter Fl. Texas 542 1894. On page 487 E. curtipedicellata was published in 1868, not "1862"

On page 491 Eatonia hybrida Vasey is given as published in Bot Gaz. 9 165 1884. No such name was published there

On page 508 Melica bulbosa has two references and was not described in either place. On the same page under M. ar stata the ligule is given as "4–6 cm. long", pretty long for a ligule ! In the line below "plumose" is evidently an error for something else.

On page 539 Poa Sandbergii is given as a synonym of P. filifolia which it is not. Below, on the same page, P. occidentalis V & S. is given as a synonym of P. trivialis var. occidentalis Vasey which it is not. On page 549 he gives P glumaris as the same as P. Kingii Watson, but it is not. Later on he redescribes it as Festuca confinis Vasey, when it is not a Festuca. (See below).

On page 567 Glyceria nervata is given as published in 1831, iustead of 1830.

On page 578, under Atropis Pringlei, he gives the leaves as "7–10 mm.", instead of .7–1 mm. wide. On the next to the last line on the next page "3–4 cm." should be mm.

On page 636 in Agropyron dasystachyum the joints "of rachilla" should be rachis.

These corrections are not intended as criticisms. Errors in citations in a monograph are propagated greatly by those without access to the books, and by that growing class, people too lazy to verify their references. Nelson in his manual has copied some of these errors.

EPICAMPES.

In working up this and allied genera the treatment accorded by Vasey, Beal and Scribner seemed unsound, since about three genera were confused.

Epicampes was founded by Presl in Rel. Hænkeana 235 t. 29. Beal gives this as a synonym of Crypsis stricta HBK., but on what authority he does not state, while his description is quite different from Presl's figure and description. Presl does not give his species as having been previously described. His figure has the panicle of the E. distichophylla of Vasey which is Muhlenbergia

Vaseyana Scribner, but his glumes are elliptical, acutish and entire and rather shortly pubescent, but those of Vaseyana are scabrous and erose to toothed. The lemma is lead–colored, a characteristic of Muhlenbergia, the awn however is very different. Presl's is a simple prolongation of the midrib, from a broad notch caused by the slight extension of the sides of the lemma as lobes, as to the figure, but Kunth in his Agrostigraphia 209 says "nervo medio sub apice in aristam excedente", or that the awn comes out below the tip, and it is noticeable that he keeps only those species with such awns in the genus. He, however, blunders by putting E. macroura in Cinna which has the awn on the back also, while E. macroura is a Crypsinna, see below. Except for Presl's figure varying somewhat his E. stricta and Podosæmum distichophyllum are the same. We know that this species has both entire and notched glumes and that the awn is also short or absent in some forms. As to Bealia, which is congeneric with Epicampes, we find it founded on a weak annual, B. Mexicana, while this genus has all robust perennials, but Beal himself rightly considers this as of little note by putting B. speciosa here. Epicampes (and including Bealia) is characterized by the (mostly) ivory–white glumes being cylindrical, rather stiff but not ribbed, faintly if at all nerved, erose to variously toothed at tip, scarious or rarely hairy, about as long as lemma and embracing it The lemma is rigid, 3–nerved, oblong to lanceolate, hairy mostly below. The specialized awn arises from just below the tip and below the lobes, forming an offset from the midrib as a raised process which in most species extends down toward the middle fo the lemma as a raised and thickened rib which becomes a simple rib below. In some species the awn is reduced to a mere knob, but in most species it is a flexuous, purple, scabrous awn, nearly an inch long. Fournier evidently recognized the distinction for he separated E. macroura and stricta from it. Bentham in Journ. Linn. Soc. 19 seems to have failed to recognize the characters, since he describes E. rigens which is a Crypsinna. The species of Epicampes are as follows.

Epicampes stricta Presl.

Epicampes stricta var. distichophylla (Presl.)

This is Podosæmum distichophyllum Presl. Rel. Hænke. 231 and Muhlenbergia Vaseyana Scribner and M. Emersleyi Vasey. It is a form with long–awned lemma and lacerate–tipped glumes.

Epicampes stricta var. mutica (Ruprecht.)

This is Epicampes distichophylla var. mutica (Rupr.) Scribner E. mutica Rupr. Bull. Acad. Brux. 9 2 230, at least so far as my No. " 4219" (really 4290) is concerned. For a long time this has

been considered as a sterile form of E. Emersleyi, but I have plenty of material with fertile florets. The general habit is that of Emersleyi but the florets are oblong, the glumes ovate to lanceolate or sometimes oblong, mostly acute and even short-awned, though in the number cited they are erose and obtuse, mostly a little shorter than the lemma, mostly evidently nerved. The lemma is oblong with the nerves close together, very scabrous but not hairy the awn a mere thickening of the central nerve at the tip or a knob or a fine awn nearly as long as the lemma. The sterile forms are without awns. This is E ligulata Scribner and it abounds from Black's Peak New Mexico (Diehl) both eastward and westward through Arizona to the San Jacinto Mts. California and southward.

Epicampes Bourgæi (Fourn.).

Muhlenbergia Bourgæi Fourn. in Hemsl. Bot. Cent. Am. 3 [illegible].

Epicampes Bourgæi var. grandis (Vasey).

This is Muhlenbergia grandis Vasey Cont. Nat. Herb. 1 [illegible].

Epicampes speciosa (Vasey).

This is Muhlenbergia speciosa Vasey, Torr. Bull. 13 [illegible].

Epicampes Mexicana (Scribner).

This is Bealia Mexicana Scribner in Hackel True Grasses.

Epicampes argentea (Vasey).

This is Muhlenbergia argentea Vasey, Torr. Bull. 13 232.

Epicampes pubescens (HBK.).

This is Agrostis pubescens HBK. Nov. Gen. & Sp. 1 136. A. lanata HBK. is a synonym. Beal, Hemsley and the Kew Index all err in crediting this to Presl under Epicampes, in Rel. Hænke. 1 235 for "Huic generi adnumeranda quoque Agrostis pubescens et lanata" does not constitute publication, any more than similar names by Bentham & Hooker did in other grass genera in their Genera Plantarum.

Epicampes anomala Scribner probably belongs here.

Epicampes Clomena (Trin.).

This is Muhlenbergia Clomena Trin. Unifl 194

CRYPSINNA.

From the work of Presl, Kunth and Fournier it seems best to rest this genus on those species with rat-tail-like spikes a foot or two long, having the Muhlenbergioid florets and the coarse and rigid thick leaves and long-acuminate and flat or involute with coarse ribs. The rays are very short (except the very lowest) and

single, coming from ribs on the sulcate rachis, the spikelets being on flexuous but not colored and rather stout and short pedicels. The floral scales are scabrous. The species of Crypsinna are:

Crypsinna stricta (Presl) Fourn.

Crypsinna macroura (HBK.) Fourn. which is Crypsis of HBK. and Cinna Kunth. This differs from rigens in the long ligule. The oblong–lanceolate glumes are about 3 mm. long or more and longer than the lemma normally, though sometimes a little shorter. The glumes are sometimes short–awned.

Crypsinna rigens (Benth.). Epicampes rigens Benth. Journ. Linn. Soc. 19 88. This differs from the species described below in the short and setaceous leaves, the panicle 1–2 dm. long and rarely over 5 mm. wide. The glumes are lanceolate to narrowly elliptical, acutish, $\frac{1}{2}$–$\frac{2}{3}$ the lemma.

Crypsinna setigulmis n. sp.

Stems round, smooth, 4–8 mm. thick below, strict, 3–4 ft. high, simple. Sheaths rather loose, coarse, rounded, the upper partly inclosing the panicle, rather many. Ligule rigid, about 2–3 mm. long, much wider than long, split. Leaves closely involute from the first and about 2 mm. wide, rigid and thick, long–acuminate and scabrous, about 2 ft. long, with age flattening out and becoming 4–6 mm. wide. Panicle 1–2 ft. long, acuminate, very compact, about 1 cm. wide nearly white, the rays and pedicels very short and closely appressed. Glumes white and very thin, scabrous, subulate as if awned, about equal, 7–8 mm. long. Lemma linear–subulate, lead–colored, scabrous, the tip with 2 short and oblong, white ears, rarely mucronate by a slight production of the midrib, about 5 mm. long, much shorter than the glumes and closely invested by them, rigid. Palet about as long as lemma and like it. This seems to differ sufficiently from C. stricta. Marsh Lake Sierra Madre Mts. Chihuahua Mexico near Garcia in dry pine woods, Middle Temperate Life Zone, Sept. 1903.

Crypsinna breviglumis n. sp.

Much like the above in habit and character except that the leaves are about 3 ft. long, flat from the first and very coarse and thick on the lower third, the rest tardily involute and 1–2 mm. wide, tapering to a fine point. The panicle as in the last, but the glumes oval to ovate, about 2 mm. long and $\frac{1}{2}$–$\frac{1}{3}$ the lemma, white, rounded and very obtuse, a little erose, rarely ovate and with midrib produced as a short mucro or awn, the upper acute and a little longer and slightly narrowed. Lemma linear–lanceolate, firm, rather dark above, acute, the lobes almost none, midrib produced as long mucro or short and straight awn. Glumes and lemma very ca–

brous. Palet as long as the lemma, similar. Guayanopa Canon, Sierra Madrre Mts. Chihuahua, Mexico, Sept. 1903, Lower Temperate Life Zone.

Calamagrostis purpurascens var. Vaseyi (Beal).

This is C. Vaseyi Beal Gr. 2 344.

Calamagrostis neglecta var. hyperborea (Lange).

This is C. hyperborea Lange Fl. Dan. 50.

Calamagrostis neglecta var. inexpansa (Gray).

This is C. inexpansa Gray Gram & Cyp. 20 and C. confinis Gr.

Calamagrostis Langsdorffii var. Scribneri (Beal).

This is C. Scribneri Beal Gr. 2 343.

Calamagrostis micrantha var. Sierræ n. var.

Stems rather robust, about 3 ft. high. Leaves about 4 mm. wide. panicle 1–2 dm. long, loose, about 2 cm. wide, strict. Awn rudimentary or very short and scarcely visible. Prattville and Susanville Cal., under pines, Middle Temperate Life Zone.

Calamovilfa poæformis (Four.).

This I assume is Cinnastrum poæformis Fourn. Mex. Pl. Enum. Gram. 90 from the description, but my species shall rest on my characters given below. Stems tufted and slender, about 3 ft. high. Root leaves several, coarse, thick, scabrous, involute, abont 2 ft. long. Stem leaf one, about 2 ft. long, with coarse sheath, with short and nearly entire ligule 1–3 mm. long, blade about 1 dm. long, involute, 1–2 mm. wide, sharp Stems simple, slender, a little longer than the leaf. Panicle very loose and open, exserted, about a foot long. Rays drooping, flexuous, nearly capillary, about 5 together, the longest often 5 cm. long to the first branch (the nodes distant), then several–rayed and with raylets loosely flowered above the middle. Florets on slender pedicels not longer than themselves. Glumes unequal, the lower 1–nerved and strongly scabrous, the upper longer and 3–nerved, flattened, thin, minutely scabrous, linear–lanceolate, acute, about 6 mm. long. Lemma nearly as long as glumes, hyaline. split into 2 long teeth, scabrous, slightly nerved, awnless, with a few setæ at base which are about ½ as long. Rudiment none. Palet a little shorter than lemma. This has much the appearance of a Poa or a Festuca of the occidentalis class. Volcano of Colima Mexico, July 13 1892, No. 478a, growing among pines on the slopes, Middle Temperate Life Zone.

Sporobolus capillipes n. sp.

Stems much branched throughout. with large panicles from nearly every sheath and partly included. Sheaths in the type longer than the short internodes, spreading. Leaves bradly 8 cm. long, 2–3 mm. wide, shortly acuminate, flat. Panicle often a foot long, oval–

ovate to lanceolate. The many rays mostly single, straight and somewhat ascending, rigid, 2–5 cm. long, with many cobweb–like pedicels divaricate at right angles and nodding or flexuous and about 1 cm. long. Glumes oval, obtuse, $\frac{1}{2}$–$\frac{2}{3}$ the lemma, smooth. Lemma oval and obtuse. San Diego Canon, Sierra Madre Mts., Chihuahua Mexico, Lower Temperate Life Zone. This may be a form of S. Shepherdi with shorter glumes and smooth lemma.

Sporobolus capillipes var. delicatulus n. var.

This has elongated and capillary stems a foot or two long, weakly spreading. Internodes a half longer than the narrow sheaths. Leaves often 2 dm. long, not over 2 mm. wide, with thread–like tip Panicle lanceolate and flexuous, mostly exserted on filiform peduncles and rather few–flowered. Glumes oblong–ovate, about $\frac{2}{3}$ the lemma. Soldier Canon Sierra Madre Mts. Chihuahua Mexico, Lower Temperate Life Zone, Sept. 1903

Sporobolus confusus var. aberrans n. var.

Glumes oblong, very long–hairy Lemma 1.5 mm. long, linear–elliptical, scabrous, sparingly hairy on the nerves. Bowie Arizona and Colonia Juarez Chihuahua Mexico, Lower Temperate Life Zone.

ARISTIDA.

In their treatment of this genus in Circ. 34 Div. Agrost. Scribner & Merrill make some errors. They speak of A. Americana as being a synonym of A. fasciculata Torr., and that it is a cæspitose and much–branched perennial. Whether it includes Torrey's actual type I cannot say, but it is not a cæspitose perennial but an annual and is not cæspitose but much–branched, in the fall, from the root and seeming cæspitose.

They keep A. pupurea distinct from A. longiseta because of being tuberculate on the lemma. All the forms in my herbarium, referred by them to longiseta are tuberculate on the lemma, some of them conspicuously so, especially the forms they refer to var. Fendleriana, most of these are scabrous and tuberculate, that is the tubercles end in short teeth at least on the upper part of the lemma.

A. gracilis is an example of carelessness in citation, Vasey gives it as published on page 152 of Elliott's Sketchbook (Cont. Nat. Herb. 3 44.) The Kew Index gives it as page 141, when it was page 142. On the same page Vasey is made to say that the awns are 3–6 inches and 1–3 inches long, which makes one feel like hanging the average typesetter, for he never seems to think that the author of a book knows anything, and if he does not happen to

have the degree, minute and second type in his font he proceeds to butcher the text till the poor author goes crazy.

A. Jonesii Vasey is the var. fugitiva of A. Californica as is shown by the type in my herbarium.

Alopecurus Californicus, Piper in his Fl. Wash. 110 says the anthers of A. saccatus are white and of the other orange. My own specimens from Pullman of A. Californica have both white and orange anthers in the same spike.

Sporobolus Nealleyi Vasey has some ludicrous citations. It was published in Torr. Bull. 15 49 1888, then in Cont. Nat. Herb. 1 57 1890, then in 3 62 1892. In the last he gives the first place of publication as Bot. Gaz. 16 48. Beal in Gr. 2 301 follows suit and the Kew Index does the same, only it goes one better by making it 15 49. Great are our tribulations when we get too lazy to look up our citations, and we all do it.

Eriocoma caduca (Beal) Rydberg is credited by Nelson in his Fl. 51 to Scribner, following Rydberg's similar blunder in Flora Mont. 25. It was first published in Beal Bot. Gaz. 15 111 as Oryzopsis.

Leptoloma Mrs. Chase in Biol. Soc. Wash. erects this genus from the Greek words " leptos" and "loma", the genus is therefore neuter and not feminine as she makes it.

Calamogrostis. This genus as revised by Kearney could hardly have been done much worse. It is full of intergrading so-called species which are mere forms. The length of callus hairs and relative width of leaves are slim specific foundations.

Stipa pinetorum Jones is a peculiar form of Eriocoma Webberi.

Stipa spartea var. Tweedyi (Scribner).

S. Tweedyi Scribner Bull. Div. Agrost. 11 47.

Stipa Parishii var. depauperata n. var.

Stems about half a foot high, rigid. Leaves about 5 cm. long, involute, arcuate, acute, about 2 mm. wide when open. Ligule rudimentary. Panicle 5-7 cm. long, few-flowered, sub racemose. Glumes 10-12 mm. long, the upper a trifle the longer, very scabrous. Lemma about 5 mm. long, broadly linear. Awn about 1.5 cm. long, kinked in the middle. Detroit Utah, May 25 1891, Lower Temperate Life Zone.

Oryzopsis exigua var. Hendersoni (Vasey)

O. Hendersoni Vasey Cont. Nat. Herb. 1 207.

Sporobolus cryptandrus var. giganteus (Nash.)

S. giganteus Nash Torr. Bull. 25 88.

Eriochloa punctata var. aristata (Vasey).

E. aristata Vasey Torr. Bull. 13 229.

Muhlenbergia brevifolia (Nutt.).

Agrostis brevifolia Nutt. Gen. 1 44. Sporobolus cuspidatus Wood.

Muhlenbergia brevifolia var. Richardsonis (Trin.).

Vilfa Richardsonis Trin. Mem. Acad. Pet. 5 2 103. V. depauperata Torr.

Muhlenbergia filiculmis (Thurber).

Vilfa filiculmis Thurber in Beal Gr. 2 288. M. Thurberi Rydberg.

Muhlenbergia Metcalfi n. sp.

Allied to M. parviglumis. Stem slender. Ligule elongated, lacerate, with thread-like tip. Leaves very acute, the root leaves about 1 dm. long, the several stem leaves 5-8 cm. long, loosely involute, about 1 mm. wide. Sheaths close, a little shorter than the lower internodes, but longer above, with a light colored ring at the ligule. Panicle exserted, loose, linear, 1-2 dm. long, strict, acuminate. Rays in twos and threes, very delicate and capillary, bare on the lower fourth, then racemosely one to few flowered, the whole rarely 3 cm long, all closely appressed. Lateral spikelets on delicate pedicels rarely half as long as lemma, the many terminal spikelets on pedicles twice as long. Glumes about equal, 2 mm. long, narrowly oblong, purplish with hyaline margins. Lemma yellowish, linear lanceolate, nearly 4 mm. long, purple-ribbed above, with only a minute tuft of hairs at very base, abruptly contracted into a very delicate awn 5-8 mm. long. No. 1485 Metcalf, Santa Rita Mt. Grant Co. New Mex., on rocky slopes at 7,000 ft. alt., Lower Temperate Life Zone probably.

The following two species have yellow or yellowish panicles. Awns not longer than the lemma. Upper glumes with short teeth on each side of the produced midrib, slightly awned. Annuals with simple stems.

Muhlenbergia Madrensis n. sp.

Stems weak, filiform, almost capillary, ascending, about 2 dm. long. Leaves thin, flat, about 1 mm. wide, 1-3 cm. long, obtuse, shorter than the somewhat enlarged sheaths which are rather loose and the upper ones inclined to have a few flowers inclosed, much shorter than the internodes. Ligule elongated. Panicle linear, about 5 cm long, few flowered, with florets closely appressed. Rays single, very short, 1-3-flowered, appressed, sometimes remote, the pedicels very short and with overlapping florets. Glumes about equal, the lower ovate and acuminate, the upper oblong and about half the lemma, light-yellow like the lemma, scabrous. Lemma linear, elliptical, obtuse, 2-toothed, scabrous, about 4 mm. long. In meadows, Round Valley near Garcia, Sierra Madre Mts. Chihuahua, No. 7315, Sept. 21 1903.

Muhlenbergia Diehlii n. sp.

Stems 2-3 ft. high, stout and a little branched at very base. Leaves several, 1 2 dm. long, about 4 mm. wide at base, quickly acuminate, acute, flat, thick. Ligule short. Panicle 1-1.5 ft. long, of very many single capillary and ascending rays 5-8 cm. long, the lower third without flowers, the rest of each ray with 10-20 florets closely appressed and racemose on pedicels about 1 mm. long. Glumes about $\frac{2}{3}$ the lemma, the lower lanceolate, the upper oblong, about equal. Lemma linear-elliptical, barely acute, scabrous, mostly with a purple blotch, 3 mm. long, yellowish like the glumes. Awn a mere mucro or $\frac{1}{2}$ mm. long. This is allied to M. flavida Vasey. Guayanopa canon Sierra Madre Mts. Chihuahua Mexico, Lower Temperate Life Zone, Sept. 23 1903. No. 7316.

Agrostis filiculmis n. sp.

Stems tufted, erect, about 1 mm. thick, 2 ft. high, about 4-leaved, the internodes longer than the narrow sheaths. Ligule 2 mm. long and acuminate. Leaves about 1 dm. long and 1 mm. wide, appressed, the root leaves very short. Panicle about 5 cm. long, few flowered. Rays very unequal, capillary, flexuous, the longest rarely 2 cm. long, appressed, racemosely few-flowered above the middle. Pedicels similar, appressed, shorter than the spikelets. The glumes 2 mm. long, acuminate-lanceolate, slightly unequal, aristate, nearly smooth except for a few short teeth on the nerves. Lemma about $\frac{3}{4}$ as long, very thin, oblong-ovate, acute, with a very slender awn attached at the middle and slightly exceeding the lemma tip. Plants very closely resembling Oryzopsis micrantha. Little De Motte Park on the Kaibab in northern Arizona, Upper Temperate Life Zone, on gravelly mesas, in the fall of 1894.

Bouteloua aristidoides var. Arizonica n. var.

Spikelets about 10-flowered, 2 cm. long. Rachis not longer than the last floret. Tucson Arizona, Thornber, No. 177.

POA

Because of the hopeless way in which the species of Poa are, by Vasey, Scribner, Rydberg and some others the writer has dreaded to take it up, but a proper regard for certain characters and ignoring trivial ones brings some order out of the chaos, though a person cannot untangle all the knots without visiting all localities at least twice with Poa particularly in mind. I have visited nearly every region exceqt the Saskatchewan, and most of them several times. I know the ecological condition under which these plants grow. I make the following changes and suggestions.

Poa Fendleriana var. arida (Vasey).

Poa arida Vasey Cont. Nat. Herb. 1 270. This is very abundant and variable and includes P. longiligula S. & W., P. pratericola Rydberg, P. Sheldonii Vasey. The species often grows in large tufts and so the outer stems seem stoloniferous.

Poa Fendleriana var. spicata (Vasey) Scr. is P. Andina vars. spicata, purpurea and most of elongata Vasey.

Poa Fendleriana var. juncifolia (Scribner).

Poa juncifolia Scribner Bull. Div. Agrost. 11 52. This is a small and rigid form growing in specially poor and alkaline soil.

Poa purpurascens var. epilis (Scribner).

Poa epilis Scribner Circ. Div. Ag. 9 5. This is a common mountain form at the north and passes into the species at all points.

Poa filifolia Vasay is P. Idahoensis Beal, P. scabrifolia Heller, P. Spillmani Piper and P. nematophylla Rydberg.

Poa Wheeleri Vasey is P. tricholepis and subreflexa Rydberg, and I can see no good character to keep Olneyæ Piper separate. It is very variable. The original is an abnormal starved form not hard to match.

Poa nervosa (Hook.) Vasey is P. flexuosa var. occidentalis Vasey, P. Eatoni Watson, P. Vaseyana Scribner and P. curta Ryd

Poa gracillima Vasey is P. saxatilis S. & W. and little more than a well marked form of P. glauca.

Poa gracillima var. Vaseyochloa (Scribner).

Poa Vaseyochloa Scribner Circ. Div. Ag. 9 1, a substitute name for P. pulchella Vasey.

Melica argentea (Howell).

Poa argentea Howell Torr. Bull 15 11.

Poa Buckleyana var. elongata (Vasey), P. Andina var. elongata Vasey. This is a slender and few-flowered variety.

Poa Buckleyana var. stenophylla (Vasey).

Atropis tenuifolia var. stenophylla Vasey in Beal Gr. 2 580.

Poa Buckleyana var. Sandbergii (Vasey).

Poa Sandbergii Vasey Cont. Nat. Herb. 1 276. This is P. incurva S. & W.

Poa Nevadensis var. Leckenbyi (Scribner).

P. Leckenbyi Scribner Circ. Div. Ag. 9 2.

Poa Nevadensis var. lævigata (Scribner).

P. lævigata Scribner Bull. Div. Ag. 5 51. P. lævis Vasey, P. Wyomingensis Scribner, P. confusa Rydberg.

Poa glauca var. strictior (Gray).

P. cæsia var. strictior Gray Man. Ed. 5 631.

Poa glauca var. crocata (Mx.).

P. crocata Mx. Fl 1 68.

Poa Bolanderi var. Kelloggii (Vasey).

P. Kelloggii Vasey Gr. Pac. 3 79.

Poa Bolanderi var. Howellii (V. & S.).

P. Howellii V. & S. Gr. Pac. 2 78.

Poa occidentalis Vasey is the same as P. platyphylla Rydberg.

Poa leptocoma var. reflexa (V. & S.).

P. reflexa V. & S. Cont. Nat. Herb. 1 276.

Poa laxa Hænke is P. alpicola Nash. The eastern plant which may be called var. debilior n. var, is laxer, with pale spikelets, and acuminate leaves, our western plants are the same as the Europæan ones.

Poa pratensis var. pseudopratensis (Scr. & Rydb.).

P. pseudopratensis Scr.& Rydb. Cont. Nat. Herb. 3 539.

Eatonia. The writer objects to the relegation of this genus to synonymy. On the showing of Scribner in Rhodora 8 137 ff. there is no reason at all for the creation of Sphenopholis by Scribner. The Eatonia of Rafinesque was apparently a Panicum and therefore a synonym. At any rate no specimens of it are extant and it should be treated as a nomen nudum. This leaves us the Eatonia of Endlicher, which is clearly defined and has been accepted as a genus for eighty years and as the proper name for the species. The "once a synonym always a synonym" dictum is the the only basis on which it rests and this foolish idea never had any conservative support. The writer holds that the merging of certain species of Trisetum with it is not sound, for it confuses both genera. Trisetum is well characterized by the split lemma with the two acuminate teeth hyaline, and the midrib produced either in the notch or below it into a conspicuous awn. In the normal Triseta the upper glume is wider below, but in the Eatonioid species T. Hallii, interrupta, palustris and filiformis (Eatonia Pennsylvanica var. filiformis Chapman Fl. S. States 560) the upper glume is larger above, and in the last species the hyaline teeth are small. Eatonia is well characterized by the entire lemma truncate or rounded at tip and awnless, and by the upper glume always larger above The spcies are two, or at the most three: E. obtusata, nitida and pallens.

Panicularia. This genus was founded by Fabricius Enum. Pl. Hort. Helm. 313 1763 and has been taken up by the Brittonians to replace the Glyceria of Robert Brown. One of the fundamental points insisted on by them (which I believe is sound and which the botanical world has accepted tacitly in practice for over

a century) was that a genus was not properly founded unless species were given with it, and on this basis alone they still persistently refer Linnæan genera to the Species Plantarum where no genera were described but had been previously. On this basis Panicularia has no standing, but with a Brittonian such a trifling thing as consistency must not interfere when there is a rich pay streak of new names in sight. It has been a time-honored custom, which is only another way for showing the mature and unbiased judgment of several generations of botanists, to ignore old genera not accompanied by species unless they were taken up later by otherrs, and in the latter case the genus was duly credited to its first describer, which is just. For example an extreme case is Calamagrostis which was first published by Adanson (since Linnæan time) who credited it to Dioscorides, but species were first made by Gmelin. So the proper credit for the genus is Calamagrostis Dioscorides in Adanson Fam. and Gmelin Syst., and not Calamagrostis Gmelin as the unjust Brittonian system would have it. In the case of Panicularia the genus was ignored and no species ever published in it till the evangel of the Brittonian hair splitters appeared in Otto Kuntze in 1898, who like them, cared more for a little notoriety than the good of botany, and renamed all the species of Glyceria as Panicularia, though Glyceria was the first genus to have species described in it, and was published in 1810. It therefore seems right for Hitchcock to retain Glyceria in the new Gray's Manual.

WASATCHIA.

Wasatchia Kingii (Watson).

Poa Kingii Watson Bot. King's Exp. 387, Festuca confinis Vasey. This genus has been relegated to Festuca where it is a worse misfit than in Poa. Watson as a field botanist recognized its similar habit to that of Poa Fendleriana and glumaris. Some Poas are diœcious occasionally or at least sterile, this is always diœcious a feature not recognized before so far as I remember, and it differs from Poa conspicuously in the coarse and rigid leaves and in the texture, in the thick and woody root, and in forming large ring-like tufts often 6 feet in diameter from its creeping rootstocks. Its spikelets are more like those of Melica than any, particularly the fertile ones. But its nearest relative is certainly Distichlis. It is not related to Festuca. Distichlis is now the receptacle of some odds and ends such as Eragrostis obtusifolia and Poa Texana, but it seems like stretching the genus too much. Our plant is quite

different in habit from Distichlis as it never grows on flat nor alkaline soil, but on high slopes in sweet soil from the oak zone to the edge of the alpine. Comparing it with Poa glumaris its stems are densely aggregated at the outer edges of the tufts but connected by stout and rigid rootstocks which are very short between the stems, unlike Poa glumaris. The leaves are flat and coarse and the ligule a short and hyaline band as in glumaris, but the leaf ribs are sharp and not rounded as in the other. The spikelets are in a linear not oblong panicle and more closely appressed. The The rays are twin, one of them often branching just above the base, conspicuously flattened, not angled as in the other, straight and not flexuous as in the other which also has the rays in threes or multiples. At the insertion of the rays is a yellow callus surrounding the rachis which is winged but smooth on the lower nodes, each joint or branch has a similar callus at base aud tip of pedicel. In P. glumaris the callus does not go across except at very base and is hairy. The spikelets are perfect in glumaris and always dicœcious in Kingii, much flattened in both; 5-7 flowered or rarely less in glumaris and oblong, normally 3-flowered and rarely 5-flowered, normally lanceolate and rarely ovate in Kingii. The rachilla in glumaris is flexuous, conspicuous and hairy; in the other straight, smooth and visible only on dissection and thus spikelet becomes ovate when 5-flowered. The glumes in glumaris are thin like the lemma but not differing above, narrowly elliptical, hardly acute, 3-nerved and keeled to the tip, about smooth and about as long as lemma; in Kingii they are conspicuously translucent and hyaline except at very base, acuminate and very acute, ovate to narrowly lanceolate, from $\frac{1}{2}$-$\frac{2}{3}$ the lemma, about smooth, slightly one to several-nerved at very base and not keeled, terminated below with a short ring-like callus as in Bromus, Festuca, etc. The lemma of glumaris is lanceolate, acute, thin, keeled to near the tip, strongly 3-5-nerved and sulcate between the nerves, occasionally with a few faint intermediate nerves, strongly scabrous-puberulent above and conspicuously long-hairy at base; the lemma of Kingii is similar in shape mostly, very acute and thin, with flat areas between the equally raised ribs, variably 5-7-nerved, often with 3 additional nerves between the main ones and so making 15-21 nerves in all, rounded on the back, scabrous-puberulent and equally so all over to nearly smooth, not hairy, notched and eared at tip like Bromus, and with midrib produced as a sharp point or minute awn.

Comparing Wasatchia with Distichlis the same can be said of its habit of growth as differing from Poa glumaris. The leaves

of Distichlis are distichous, folded, long-acuminate, very rigid, pungent, divaricate, rarely over 2 mm. wide; those of Kingii are not distichous, shortly-acute, flat and often 1 cm. wide, ascending. The ligule of Distichlis is a ring of hairs; of Kingii a flat and hyaline band. The rays of Distichlis come out singly and branch racemosely and without any special callus at the nodes, are flat and very scabrous, the spikelets are much flatter, the glumes and lemma similar to eachother, coriaceous, rounded, not sulcate, the nerves are rather many and about equal, vanishing below and at very tip and scarcely at all raised, the shape about ovate and very different from Kingii. The spikelets are generally many-flowered. ☞ On May 19 pp. 1-16 of these Contributions had been printed and on this date I received the May Bulletin containing Rydberg's Hesperochloa (Piper) which therefore antedates Wasatchia by a few days, though my MS. and critical work preceded his publication many months. Rydberg in this follows his usual course of copying the work of others without critical study of his own, a subgenus by anyone is off hand a good enough genus for him, and so forthwith he erects the new genus and in this exceptional case it will stand. The sum total to the previously published facts on it are that it is diœcious, the stigma is extra plumose (a character common to Distichlis and many Poas), and that the stems are "occasionally stoloniferous" ! I should say so !

AGROPYRON.

This genus, in the light of today, was bunglingly treated by Scribner and Smith in their revision, Bull. 4 Div. Ag. They failed in synonymy, their keys were poor, and their conception of specific limitation bad from lack of field work. Out of the four new species proposed not one is valid, while one variety may be a good species, A. caninum var. andinum which is based on my No. 720 from Colorado. This is either a sport, hybrid between violaceum and caninum, or a valid species. My material appears abnormal, like a sport due to some diseased condition.

Agropyron caninum var. Richardsoni (Trin.) n. n.
Triticum Richardsoni Trin. Linnæa 12 467.

A. spicatum S. & S. is A. Smithii Rydberg. To this must be reduced the following:

Agropyron Smithii var. Palmeri (S. & S.) n. n.
A. spicatum var. Palmeri S. & S. Rev. Agropyron 33.

Agropyron Smithii var. molle (S. & S.) n. n.
A. spicatum var. molle S. & S. Rev. Agropyron 33.

Agropyron Smithii var. riparium (S. & S.) n. n.
A. riparium S. & S. Rev. Agropyron 53. This is a variety with very short glumes.

A albicans S. & S is almost certainly an awned form of A. dasystachyum.

A. spicatum (Pursh) Rydberg must include the following: (Piper Fl. Wash. 146 credits this to S & S. l. c 33 erroneously, the plant they describe is A. occidentale Ser. which is A. Smithii Rydberg. It is true at the close they state it is Festuca spicata Pursh but their description differs and must take precedence. The proper citation is A. spicatum (Pursh) Rydberg Fl. Mont 63.)

Agropyron spicatum var. Arizonicum (S. & S. Rev. Agropyron 27 as species) n. var. This includes A. Parisii S. & S.

Agropyron spicatum var Pringlei (S. & S. l. c. 31 as A. Gmelini var.). I have a complete line of intergrades between all these forms.

Agropyron tenerum var. pseudorepens (S. & S. l. c. 34 as species).

A. tenerum, as Hitchcock has shown, includes pseudorepens, but this is a well marked form growing in alkaline places. The original A. tenerum, of which I have ample material, was undoubtedly material of the second year from seed started in the fall (Vasey describes it as a seemingly annual) growing in sweet and good soil where it almost never stools, or the rootstocks are very short or hardly noticcable. In alkaline soil it stools out and produces copious runners. This is the tendency with most grasses, though we would expect the reverse as the effect of salts on vegetative processes.

A. Scribneri is an Elymus of the Sitanion group.

Bromus eximius (Shear) Piper Fl. Wash. 143 exhibits the beauty of the botanical bunco game attempted to be worked on botanists by the Brittonian system which the world botanists have rejected. The system, like the Irishman's turtle with its head cut off and still wriggling its tail is dead but the tail portion in the person of the man who forced it on the Department of Agriculture is not sensible of it and compels better men to use it in publications of his Division. It is the belief of some geologists that the Silurian age was not contemporaneous throughout the world and some things in the Department of Agriculture squint that way, but the writer believes it is a case of arrested development. Shear described B. vularis and refers it to B. purgans var. vulgaris Hooker. Piper concludes that it is different and because of the previous varietal name changes it and all its varieties. To make it

worse Piper overlooked the earlier B. ciliatus var. ligulatus which his Brittonian system will compel him to adopt along with a new set of names. The whole system has become an intolerable nuisance, and yet this is not the worst part of it.

SITANION.

A study of the genus in the light of Smith's revision shows that it cannot be maintained for it passes directly into Elymus at all points.

Elymus Scribneri (Vasey).

Agropyron Scribneri Vasey Torr. Bull 10 128.

Elymus Saundersii includes Sitanion planifolium and lanceolatum.

Elymus brevifolius (Smith).

Sitanion brevifolium Smith Rev. Sit. 17. This includes S. Leckenbyi, longifolium and pubiflorum.

Elymus insularis (Smith).

Sitanion insulare Smith l. c. 14.

Elymus Hystrix (Nutt.).

Ægilops Hystrix Nutt. Gen. 1 86. This includes S. elymoides, molle, cinereum, strigosum, cæspitosum, montanum and Brodiei.

Elymus minor (Smith Rev. Sit. l. c. 12 as Sitanion).

Elymus multisetus (Smith).

Sitanion multisetum Smith Rev. Sit. l. c. 11. This includes S. jubatum and villosum.

Elymus ambiguus includes E. salinus Jones, E. simplex S. & W. and E. aristatus Merrill.

Panicum Urvilleanum occurs from Kelso in the Amargosa desert south and west, California. Hitchcock & Chase do not record it within a long distance from there.

Carex fissuricola Mackenzie. Mackenzie goes directly against the facts in making this new name for C. ablata Bailey. Bailey in Proc. Am. Acad. 22 92 gives frigida as found by Watson (see Bot. King's Exp.) in Cottonwood Canon Utah, also says it may be C. luzulæfolia, then in Bot. Gaz 13 92 he describes it and quotes Watson's plant as the first of the type specimens, my own copious material has been widely distributed. In Coulter's Manual 380 published earlier he describes the species fully, based on the Utah specimens and under the head of C. frigida. It therefore is certain that the Utah material is the basis of C. ablata, and on this C. fissurata is founded and by altering Bailey's characters in sev-

eral important particulars. It is comical to see how the mere name of Bailey sets the Bronx menagerie in a rage, and all because he was the first man to dare to attack the Brittonian system. They jump on him like wild cattle of the Plains on the hair of a dead coyote. It might be a good idea for our Bronx friends to get shod as they have quite a job ahead of them killing off all such enemies, or they might be as badly off as the Kilkenny cats, nothing but the tails left.

Scirpus Clementis n. sp.

Allied to S. cæspitosus. Stems densely matted like Carex filifolia, deeply sulcate, 2-3 inches high. erect and strict, leafless. Leaves thick, filiform, 2-grooved above and deeply grooved below, very blunt with a rounded callus. Head terminal, about 2-flowered, subtended by a colored and leaf-like bract 3-4 times as long. Scales elliptical, obtuse, about 3 mm. long, tawny. Akene about 2 mm. long, obovate and triquetrous, with 3 long filaments and no bristles, papillate, with a minute mucro at the almost truncate tip. Rae Lake, King's River, California, alpine, July 20 1910, Mrs. Clemens.

LILIACEÆ.

Zygadenus. In speaking of the poisonous effects of this genus Piper, in Fl. Wash. 198, casts doubt on the fact and intimating that it is a fiction. One cannot be too careful in discounting common experience as the baneful effects are accentuated by supposedly correct scientific publications like this, causing deaths. In 1894 I was (in their estimation) "floored" by C. Hart Merriam and others of the Biological Survey by the specious argument that the Gila monster could not be poisonous because it had no poison fangs, while I had records of deaths by it. Now its poisonous nature is admitted in spite of absence of fangs.

In the case of the poison sego (Z. paniculatus probably) there are several well authenticated cases of deaths within 24 hours by people eating the roots. The deaths all ended in convulsions like Veratrum poisoning. Years ago I sent a quantity of the bulbs to Washington for analysis, but for "lack of material" the test was not carried beyond determining that they contained an alkaloid which "probably was the poisonous principle". We know that Veratrum contains several poisonous alkaloids and is a close relative. Prof. Orson Howard (formerly Prof. of botany in our state university) was out on the hills, with a companion digging and eating sego (Calochortus Watsoni) bulbs, when they happened to find a par-

ticularly large one they drew "cuts" to see who should have it. The other boy got it, ate it and became sick and died that night. Several similar cases gave it the name of "poison sego". There is no other poisonous bulb in Utah but the two species of Zygadedenus that could have caused the trouble, and Z. venenosus is out of the question because it grows only in meadows with us, though farther north where the humidity is greater it has the habit of the other. Piper refers to Z. venenosus, but none but a botanist can tell them apart.

In Torr. Bull. 30 272 Rydberg, in his usual careless way, attempts to segregate sections of this genus into three genera and without any acknowledgment of the fact that these distinctions were known before he was born. He makes Toxicoscordion differ from Zygadenus proper (which he confines to Z. glaberrimus) in having a tunicated bulb instead of an elongated rootstock, in having a free and not adnate corolla, and in having a single obovate to half-round gland. Anticlea he separates on the V-shaped gland and adnate ovary, it also has the tunicated bulb of Toxicoscordion. Now an examination of the genus shows that its species fall naturally into two rather well defined groups (shading into eachother), the large and white-flowered (often with a tinge of blue) forms with twin or V-shaped single gland which is morphologically a union of two glands at the lower edges, and the small yellow-flowered forms with a single obovate to oblong gland. The white-flowered forms all have a rootstock, but it is elongated only in Z. glaberrimus. The yellow-flowered forms are without a rootstock or a mere rudiment. Rydberg ignores these manifest facts and unites Z. Fremontii with the yellow flowered forms because it has a free ovary, that is, because the corolla segments are split to the base as is the case with the others. A critical examination of the gland of Z. Fremontii shows that it belongs with the V-shaped class although the gland is usually so imperfect that it is a mere greenish band around the top of the claw, but whenever it is developed at all there are two centers, one on each side of the midrib, where it is the most pronounced. The claws of the yellow-flowered forms are so narrow that there is no room for two well defined glands and thus are crowded together till the lower edges coalesce on the inner margins, and because they are set obliquely, they form the V-shaped compound gland. In the small flowered forms of the white-flowered group we finb the gland often obscure in Greene's Z. porrifolius (which is the same as Z. virescens and only an extreme form of Z. elegans). The small flowered forms of Z. Fremontii have a yellowish shade to the flowers, and Z. chloran-

thus (unknown to me) seems to have the same character. Another character that shows the folly of separating the species of this genus is in the pod which in the elegans class is ovate-acuminate and long-styled, while in Fremontii and the yellow-flowered forms it is oblong and nearly truncate at tip with very short styles. The leaves of the white-flowered forms are naturally glaucous and light-colored, flat above, and normally broad though narrow, in small forms. The leaves of the yellow-flowered class are a peculiar yellowish-green, always narrow and triquetrous or channeled in or near the tip. The bulbs of the white-flowered class are shallow, that is near the surface, the others deep in the ground Rydberg's Z. intermedius, acutus and gramineus are forms of venenosus, and falcatus is a form of paniculatus, all these he puts in Toxicoscordion. Anticlea Coloradoensis is the high altitude form of Z. elegans and is the same as Blankenship's Z. alpinus. Z porrifolius Greene which has been distributed by Wooton both as Mexicanus and porrifolius (both named by Greene) is as I have said an extreme form of elegans, just as my Z. Fremotii var. brevibracteatus is an extreme form of that species, Miss Eastwood's Z. micranthus is the same and her Z. exaltatus a large form of Fremontii. Z. longus Greene is a green-flowered form (a common state also in Veratrum) and is the same as one of my specimens from A Nelson marked "Z. dilatatus Greene". Z. chloranthus I do not know, but it cannot be maintained on the characters given by Robinson and Fernald in the Manual as distinct from elegans of which I have plent of material from near Pursh's type locality as well as elsewhere. Z. Mexicanus (Townsend & Baker, named by Robinson) is the same porrifolius form of elegans and corresponds with other material from Black Mt N. M. (Wooton as elegans) and from the Mogollons (Wooton as Mexicanus).

In the May Bulletin Rydberg indulges in some puerile pettifogging to escape, but cannot answer, my criticisms. In Contributions 12 77 I attacked his work showing the inaccuracy of his description of Z. intermedius of which my No. 2091 is one of the 7 types on which he founded the species. In answer he says that the first specimen was the type "and therefore he is not more accurate than I". Rydberg evidently does not know the difference between a type specimen and a type. If with material from six other localities before him he deliberately ignored them and founded his species on the one Sandberg specimen the botanical world will not seek to find the cause of his poor work. Everyone else knows that all material passed under review is a part of the type unless differing enough to be noted by the author.

It is a matter of no importance to the botanical world whether one or the other of us is "the more accurate", it is after the facts and wants the problems of systematic botany settled, not befogged, and that too in the full light of genetic relationship, ecology and geological history, and not in the line of the number of bugholes in the leaves or the rulings of a metropolitan inspirational autocrat.

Dasylirion Zucc. is not properly derived. It is from the Greek dasus and leirion, and therefore should be Dasyleirion. This brings the pronunciation in line with the Greek.

STENANTHIUM and STENANTHELLA. Rydberg in Torr. Bull. 27 530 attempts to make a new genus of Stenanthium, calling it Stenanthella. His characters for it are: superior ovary, perfect flowers campanulate and with conspicuously reflexed lobes, and different habit. How a person can blunder so and with specimens before him and supposedly a little field work is hard to see. For Stenanthium he gives: ovary partly inferior, polygamous flowers not campanulate and without reflexed tips. Stenanthium occidentale (which he puts in Stenanthella) is polygamous, I have ample material gathered and studied by me, in the field in all stages. The fully mature pod is 4-6 mm. long and adnate as he would find if he took the trouble to dissect the so-called obconical stipe. The pod appears lanceolate but is really fusiform with the cavity extending to the base. The flowers are campanulate and with reflexed tips. This species is pratically his type of Stenanthella. By referring to Britton's Flora 1 403-4 we find both species of Stenanthium figured as having campanulate flowers with reflexed tips. In S. occidentale the segments form a narrower flower than in either of the other species, but that is all. The only characters on which he could possibly found his genus he omits: the drooping flowers in simple not compound racemes, and leaves normally lanceolate and acuminate at both ends, but these are not good generic characters. Another peculiar feature of S. occidentale is that the segments are not only "withering persistent" as in many other Liliaceæ but enlarge or elongate with age becoming green and remaining so till the pods mature. The segments retain their real shape but a day and then the margins inroll. The erect part of the segments which form the bell part of the flower is broadly oblong and with hyaline margins, it then narrows abruptly to the broadly lanceolate to long-linear and thick tip which in flower is reflexed and is erect in fruit and green, in the sterile flowers they are light-colored, hyaline and do not elongate, the fertile ones are dark-purple or a lurid-green. The leaves are generally conspicu-

ously long-acuminate at both ends, often an inch wide in the middle but at other times are 3-4 mm. wide and only a trifle wider in the middle but as long as the others. The plant is high alpine, growing just on the edge of stunted tree belts along gulches filled till late with snow.

VERATRUM. An examination of all the species of Veratrum after many years field study and note taking on the ground leads one to reject the work of Heller and Rydberg as untenable because it is founded on trivial and evanescent characters of no worth. Heller bases V. Eschscholtzianum on the drooping panicle branches, when eastern forms (V. viride) are often drooping and western forms often erect. Western forms are described by him as having bracts as long as or longer than the flowers, when in fact they are more often shorter, some of my material have bracts hardly longer than the pedicels. V. Californicum Heller tries to disintegrate, he separates V. speciosum giving it acute petals and a V-shaped mark at base, when in fact every gradation can be found on the same plant. He separates out V. Jonesii on my material gathered for the fruit (from Idaho) on the basis of a single specimen (seen by him) collected after the petals had shrunk by maturing and partly drying before I gathered them and so had become half their normal length. The rest of this material got at the same time and place has petals from wholly dried to fresh on the same plant (before gathering) varying from 5-8 mm. long and from oval to almost linear and the V-shaped mark from very evident to nothing at all. Naturally one would expect a botanist to know by the maturity of a specimen why it was collected but if we are to the thinking for the closet botanist to prevent fake species he will have to go out of business or we shall have to label our material "gathered for the fruit, petals shrunk to half by partly drying in the air, closet botanist nota bene, see this ☞", and then if they do not pay any more attention than they usually do to collectors notes will we be guilty under the law of contributory negligence? V. tenuipetalum Heller founds on linear petals and lax and open inflorescence more like that of V. viride. I have similar material from its range, the south, New Mexico, Arizona and the Sierra Madres with the same lax habit and elongated petals often 4 mm. wide and not linear. V. caudatum Heller founds on a common form with elongated panicle axis and narrow petals. This is frequent from Salt Lake City northward and as often has oval as linear ones and varying greatly in length. The tail of the panicle varies from 1-2 ft. long to nothing at all. One would hardly expect a botanist to be ignorant of the fact that plants in rich soil or with an excess of water will run to leaves and bracts and and

many flowers, the great abundance of the latter making them smaller, and excess of sunlight reducing the size of parts and narrowing the petals. Such elemental facts should hardly need to be stated but it seems that some of our College men have yet to discover them. The time was that after securing their Ph. Ds. we gave our young men their final polish by a few years in Germany, but now we shall have to do it in the kindergarten —or the woodshed.

The petals of Veratrum are described as sessile, but all have a short and thick claw, those of Californicum are often lacerate on the upper margins, the flowers are rotate to campanulate, the basal nerves are impressed, the stamens have recurved tips, and all species have the base of filaments deltoid-enlarged.

CALOCHORTUS. After a generation of field work there are several species I do not yet know well, but I omit most of these. I offer the scheme below as a more natural arrangement.

Calochortus Watsoni n. sp.

I propose Calochortus Watsoni for the plant generally known as C. Nuttallii T. & G., but not the plant described by them in Pac. R. R. 1 124. That plant is C. Leichtlinii Hooker and Nuttallii var subalpinus Jones, it is the only species like it growing in the high Sierras and is at once separable by the sagittate anthers. The amount of divergence and length of the lobes vary, but never is absent. C. Watsoni is the plant of Watson in King's Report as to specimens collected under the name of Nuttallii, is the plant described in Coulter's manuals, etc, but for convenience I designate all material distributed by me under Nuttallii as the types, except the varieties. Watsoni is rarely less than 2 ft. high, the other rarely more than 1 ft.; Watsoni has stem leaves and bracts broad at base and abruptly contracted into a long filiform tail, the other has leaves tapering gradually from base; the anthers of both are strongly ribbed as in Gunnisoni; the petals of both are similar but the gland of Nuttallii is oblong and not bee-hive-shaped as in the other and the petals are normally with a large ovate purple eye near the middle, while in Watsoni they have a reversed V-shaped eye low down or a crescent a little way above the gland; the pods of Nuttallii are mostly broadly lanceolate and shortly acuminate and much shorter than the linear and long-acuminate ones of Watsoni, the latter abounds from the dry juniper mesas of New Mexico through southern Utah to the foot of the Sierras and northward, never alpine and rarely growing far up in the Middle Temperate Life Zone, very rare in Montana (if found there at all) and Idaho. Most of the plants of the north referred here are large

forms of C. nitidus which is not bulbiferous at basal leaf, more slender and at once separable by the ribless anthers.

Calochortus Watsoni var. ambiguus n. var.

Stems about 2 dm. long; flowers purple; gland often below the filament tip and broad and about round; anthers mostly longer than the filaments. This much resembles C. flexuosus but the filaments are yellow and the anthers mostly purple, and the base of petals yellow as well as gland except a narrow purple crescent above the gland. The stems are only slightly flexuous and nearly erect. The ribbed anthers at once separate it from flexuosus. It is abounds throughout the Navajo Basin and south to the Pinals in Arizona. Lower Temperate Life Zone.

Calochortus acuminatus Rydberg is C. macrocarpus as to original description and figure. In his Fl. Col he refers forms of C. Watsoni to it.

Calochortus speciosus n. sp.

I propose this name for the most remarkable species in the genus not because I think it is new but because no one seems to know what C. Kennedyi is. If Watson's description of that species was right then this is new, but he was often inaccurate in the revision of the genus. Stems rarely 2 dm long, mostly stout and short, not bulbiferous, erect, somewhat flexuous and with short internodes and several rather rigid and falcate leaves, the root leaf greatly elongated and the stem leaves much shorter and with broad bases hyaline-margined, the coarse bracts similar and 2-8 cm. long but broader below. Flowers mostly 2 and terminal, on short peduncles rarely 5 cm. long and enlarging upwards. Buds about 2 cm. long and 1 cm. wide, ovate. Sepals about ovate and apiculate, nearly olive-colored, with broad hyaline margins, about 2 cm. long. Petals when fresh brilliant brick-red, fan-shaped, 3-5 cm. long, erose, the lower $\frac{1}{3}$ nearly black with a large laciniate-edged blotch, the very base yellow. Gland very small or obscure, roundish, with very short hairs, mostly nearly black. Hairs of petal on black part few, long, club-shaped. Anthers tapering toward tip, linear, obtuse, purplish, about 1 cm. long, on very short deltoid and yellow filaments about $\frac{1}{4}$ as long. Style slender, about twice as long as the large stigma is broad. Pods acuminate, linear-lanceolate, 2-3 cm. long, deeply lobed. The sepals and petals usually are colored through near base with splotches of purple. Flowers often 6 cm. wide. Frequent from Chloride Arizona to Congress Junction at least, westward through Kelso to the Argus Mts. California, among junipers on dry slopes, in very poor soil, Lower Temperate Life Zone.

Systematic Arrangement.

A. Pods acuminate, narrow, wingless, mostly erect. Glands mostly scaleless.
AB. Only the lowest leaf with a bulblet. Pods and flowers erect.
ABC. Flowers yellow or red.
Flowers yellow. C. Weedii, luteus, clavatus, aureus, venustulus?
Flowers brick-red. C. Kennedyi, speciosus.
AB2C. Flowers neither yellow nor red.
AB2CD. Anthers flat, 2-3-ribbed.
AB2CDE. Gland not wider than long.
Gland without scale-like border. C. striatus, Palmeri, splendens (excavatus and invenustus are synonyms), Plummeræ, Catalinæ, venustus
Gland with scale-like border. Anthers acuminate, but obtuse. C. macrocarpus (acuminatus a synonym).
AB2CD2E. Gland broader than long. Stems mostly prostrate and contorted. C. flexuosus.
AB2C2D. Anthers 5-7-ribbed.
Anthers obtuse.
Anthers sagittate. C. Nuttallii.
Anthers not sagittate. C. Watsoni.
Anthers acuminate and tailed. C Gunnisoni.
A2B. Most of the leaves with bulblets in the axils.
A2BC. Pods erect.
Flowers yellow. C. venustulus?
Flowers purple. C. Ghiesbrechtii, exilis, spatulatus, purpureus.
Flowers nearly black. C. Pringlei.
A2B2C. Pods and flowers nodding.
Stem leaves not enlarged below. C. barbatus.
Stem leaves enlarged below.
Petals smooth. C. grandiflorus
Petals hairy. C. Hartwegi, cernuus.
2A. Pods winged, broad and obtuse, often nodding. Gland mostly transverse and lunate. Leaves flat and mostly broad.
2AB. Pods and flowers erect. Flowers white to purplish. Gland scaleless.
Gland longer than wide. Flowers large. Anthers long. C. Lyoni, nitidus, Greenei
Gland wider than long. Flowers small. Anthers short. C. longebarbatus.
2A2B. Pods and flowers pendent.

2A2BC. Gland scaleless.
Flowers yellow. C. apiculatus, Howellii.
Flowers not yellow. C. Tolmiei.
2A2B2C. Gland covered by a scale which is often lacerate.
Anthers obtuse, not acuminate.
Flowers bell-shaped. C. nanus, lilacinus, uniflorus.
Flowers globose. C. albus, pulchellus.
Anthers acute and acuminate.
Flowers yellow. C. Benthami
Flowers cream-colored. C. Purdyi
Flowers rather purplish, neither yellow nor cream-colored
Petals broader above, mostly rounded. C. Maweanus, cæruleus, elegans.
Petals broader below, acute. C. Lyallii.

Though I have considerable material from near the sea I have done little field work on the species and my opinion is no better than that of a closet botanist (which is seldom worth much), and so is only tentative, but I have studied nearly every other species in the field.

Schœnocaulon Megarrhiza n. sp.

Stems from a thick, erect, coarse bulb 3-5 cm wide and about 1 dm. long which is truncate at both ends and thickly covered with coarse fibers. Leaves 2-3 ft. long, flat slightly narrower below only, coarsely and very strongly 13-ribbed, the widest about 8 mm. wide and tapering to a long and thread-like tip, glaucous-yellowish-green, Nolina-like, smooth but with minutely scabrous edges, lax. Stems 2-3 ft. high, nearly round, strict, 2-3 mm. wide, ending in a simple spike-like and rather dense raceme which is 1-1.5 ft. long. Floral bracts very broad, about 2 mm. long, dull, hyaline. Pedicels about 1 mm. long, very stout, ascending, not jointed. Flowers greenish, about 3 mm. broad, the base broadly bell-shaped to hemispherical and about 1.5 mm. long, segments nearly 3 mm. long, the broad and green midrib extended as a tail beyond the cuneate to rhomboidal lower half or third which has its sides produced as hyaline wings or ears rather deltoid in shape. Stamens about $\frac{1}{4}$ longer than the corolla, with relatively enormous anthers about $\frac{1}{4}$ as long. Ovary ovate, with mostly twisted tip, becoming a lanceolate and rather glaucous erect and 3-angled pod. Styles 3, thick, tapering, a little recurved, stigmatic on the inner face at tip. Guayanopa Canon Sierra Madre Mts. Chihuahua Mexico, Sept. 23 1903. Lower Temperate Life Zone.

Camassia Leichtlinii var. Watsoni n. var.

Quamasia Quamash (Pursh) Coville. An examination of a large amount of material coupled with much field work shows that this is not distinct from C. Leichtlinii. The senseless name of Coville I reject for evident reasons. It seems to have escaped the notice of Watson and others that the petals are 3-nerved and the sepals 4-7-nerved, or at times even more. The species Cusickii, Howellii, and Suksdorfii probably can hold but are very weak.

ORCHIDACEÆ.

Gyrostachys is credited to Persoon's Synopsis 2 511 by the Kew Index, and by Britton Fl. 1 470. It seems that the first one to copy this blunder was Kuntze, then MacMillan, then Britton and Rydberg tagged along behind, all too careless to look it up. The modest way in which they forget to remember to call our attention to their fake names so made is in vivid contrast with the noisy way Rydberg calls our attention to Ames's blunder on Serapias, in a recent Bulletin. It would seem that the making of a lot of fake names because certain people were too lazy to look up a reference right at hand was an inadvertance not worth mentioning, while for Ames to make a new name or so after long research because he failed to find an obscure reference that nobody knew anything about (and Rydberg found only accidentally) was little short of a botanical crime. What a difference it makes whether one holds a ten cent piece right over the eye or puts it a mile away as to its apparent size.

Dumort seems to have been the first to publish a Gyrostachys, in Fl. Belg. 1827, nine years after Spiranthes Richard, and fifteen after Ibidium Salisb.

Habenaria. In checking up Rydberg's work on this genus and in the light of Krænzlin's revision it became necessary to go over most of his proposed species and genera. I see no evidence of care or thoroughness, or the unearthing of new facts. His new genera are based not on discoveries, but on characters known before he was born. His species are largely descriptions of individual plants and showing little capacity for generalization. In Torr. Bull. 28 611-2 he calls attention to some errors of Krænzlin's (with some reason, for if our own closet botanists often miss the mark a mile how can we expect a Europæan to do as well who by lack of local field work does not know a coulee from a toadstool) and says "A work with such numerous and glaring mistakes reflects little credit to the author, and how can it be trusted?". Rydberg on p. 612 says that Watson never published a Habenaria flagellaris which is literally true, but he seems to be wholly una-

ware that Watson published H. flagellans (Bot. Cal 2 483) which Krænzlin meant. In his key p. 614 Rydberg says " Lip linear i. e. not at all dilated at the base". Now out of the 8 species he has given under this head he figures 4 with dilated base, and H. stricta which he places first would make 5 We repeat "A work with such numerous and glaring mistakes reflects little credit to its author". Though Rydberg must take his own medicine I do not approve of this babyish claptrap style of inferential argument. Because Rydberg was too careless to look in the appendix of Bot. Cal., and Krænzlin's typesetter or copyist misspelled a word proves nothing but Rydberg's special tendency to quibble. Either man might be an expert for all that. If a man had the best proof readers in Government employ behind him, who can spend a week in chasing down a turned letter and put before you a clean proof with all his and your errors corrected it might be different, but most of us have to contend not only with our own exasperating slips but with ignorant or lazy Union linotypers who charge you two prices for butchering your text, anb then compel you to correct all proofs the first of which when corrected is like a war map and margin too small to hold the corrections. Then after about four seances with the typesetter and a few with the proprietor you get so that you cannot see straight up, and so the matter goes to press and you ——. Well, you are grateful that it is over. The value of every man's work is purely a question of keenness of observation absence of bias and willingness and capacity to interpret Nature as he finds it.

The field botanist knows that the western species of Habenaria occur in three well marked groups. One has the bottle-like spur, H. stricta, this is often with lurid (usually green) flowers and then is Rydberg's Limnorchis purpurascens. The other two groups are with slender and falcate spurs at least 5 times as long as wide and variably clavate. One group has green flowers, the other white, and they grow side by side and shade together. The spur varies from ½ as long as the lip to 3-4 times its length, and from filiform to broadly linear, and every sort of leaf variation is found with the varying forms as well as leaf development. The green forms are those with a tendency to excess of chlorophyll in all parts and a diminution of leaf- and increase of bract-surface, with mostly more slender stems and looser inflorescence (effects of ecological conditions persisting through one or two generations only), other forms are the reverse, i. e. succulent stems and small bracts and white flowers. It reminds one of the cleistogamous Viola forms and the reciprocal relations of style and corolla in some borages. Krænzlin therefore was justified in making wholesale reduction of spe-

cies of Habenaria, and in reducing all of the group of hyperborea to one species. This disposes of Rydberg's Limnorchis.

Taking up Piperia Rydberg which includes the H. elegans group, we find Rydberg founding it on the rounded tubers (due to growing in drier soil) as distinguished from the elongated fusiform fleshy roots of the swamp-loving H. hyperborea, and on the few leaves mostly basal and perishing quickly (characters necessisarily attendant on an orchid growing in yellow-pine forests if the leaves are not specialized as in Pyrola or Goodyeara where we find good generic floral differences also. All "Limnorchis" species grow in wet and shady places, mostly in swamps, and of course the leaves do not wither early since the humidity is mostly near saturation. The roots in common with all similarly placed plants need no special appliances and are fleshy and elongated, being as often ovate with a prolonged tip as fusiform. His Piperia on the other hand grows in well drained soil in open pine woods where the humidity is high only in spring and so the leaves not being specialized must die early. The roots must economise and so drop the straggling tips, but do not differ uniformly otherwise. Naturally the flowers average smaller but are not uniformly so. This disposes of Piperia, a little hard on Piper to be so ruthlessly snatched fom the Rydbergian immortals, but I hope he can "grin and bear it"—— or bear it without grinning. Rydberg might try another whack at it by calling one of his to be genera Smokeria, and we by the strenuous use of gray matter could still see the piper in it!

Lysiella Rydberg is intermediate having one leaf and still narrower roots than Limnorchis and grows in the deepest shade. Lysias again has partly the habit of Piperia but in moister and richer soil has the root system of Limnorchis and dies down early to avoid flower and leaf reduction, pretty specific devices but certainly not generic.

I fail to see the consistency of the position of Ames in the new Gray's Manual of Robinson and Fernald in changing Goodyeara to Epipactis and this to Serapias. As far as I can see Haller's Epipactis of 1742 had no species. This is Goodyeara 1813 and Peramium 1812, both genera had species. This is inconsistent with the position toward Rafinesquean genera such as Achroanthes. Ames relegates our species to Serapias which seems decidedly different. Species of our Epipactis were described as early as 1769 (see also remarks of Rydberg referred to above).

Lupinus. At this time I take up only one group.
L. prunophilus Jones had a line of text omitted. It was collected at Mammoth Utah near the Sioux mine, it is a synonym of L humicola Nelson which I overlooked. There is no dividing line

between L argenteus and laxiflorus, the normal argenteus calyx is truncate at base, but plenty of forms occur with both truncate and spurred calyx on the same plant. The leaves are normally thick and less inclined to open, while in laxiflorus they are thinner and often flat.

Lupinus laxiflorus var. tenellus (Dougl.) T. & G. is a well defined form with small flowers and flat leaves less pubescent.

Lupinus laxiflorus var. arbustus (Dougl. in Bot. Reg. 1230 as species) is the common Columbia Basin form with large leaves.

Lupinus laxiflorus var. thiochrous Piper is a large-flowered yellow variety of calcaratus Kell. and is probably rightly referred to laxiflorus. This extends from Ketchum Idaho (Mrs. Brodhead) to Mt. Ibapah western Utah (Jones) and through Nevada westward (Wells, etc. Jones).

Lupinus laxiflorus var. argophyllus (Watson Proc. Am. Acad. 8 532 as argenteus var.) This has the leaves of argenteus and the calyx of laxiflorus, and runs into all sorts of forms as to pubescence from smooth to densely velvety with yellow pubescence, and as is usual with nearly all the lupines the flowers vary from 8-11 mm. long. This includes L. argentinus Rydberg from my herbarium, pseudoparviflorus Rydberg, pulcherrimus Rydberg. Forms of argenteus are adscendens and laxus Rydberg and alpestris Nelson. L. comatus Rydberg is L. sericeus.

Drudeophytum Clementis n. sp.

This species is a close ally to D. vestita and seems nearest to Podistera. I have named it Pycnothryx Clementis provisionally but put it here for the present till the status of D. Harkwegi is fixed which is the type of the genus. Acaulescent perennial from a tuberous and deep root, with a single rather stout peduncle 4-7 cm. long and erect to decumbent and bractless. Leaf single, radical, on a stout marginless rather fleshy and angled petiole 4-7 cm, long. Blade ovate to deltoid, 1.5-4 cm, long and wide, tripinnate, thick and leathery, the primary divisions short-stalked and the rest sessile. Leaflets obovate, about 2 mm. long, entire, with white and triangular cusp or prickle, and with narrow cartilaginous margins and densely rough-hairy with very stiff short flat and tapering hairs widely spreading. Flowers in a compact terminal head about 1.5 cm. wide. Involucre none or a narrow hyaline wing or sometimes a wide and short hyaline bract. Rays 5-10, very stout, about equal, rarely 4 mm. long. Involucel a broad and fleshy palmate bract, partly clasping, 4 mm. long, 3-5-lobed to the middle with sharp triangular divisions mostly smooth. Flowers mostly sterile, 5-10, and linear-cuneate and 3 mm. long, with conspicuous mooth and

rigid calyx lobes hyaline-margined and widely spreading, 1 mm. long. Ovary densely hairy like the leaves. Petals white. Anthers purple. Fruit oval, about 2.5 mm. long, scarcely ribbed on the back and without evident lateral ribs or wings, rounded, much compressed dorsally and cross section oblong, much like Fig. 83 in Coulter and Rose's first monograph, but much flatter and the edges of the seed nearly touching, and wingless, rounded at both ends, only one seed matured (this probably distorts the normal shape). Oil tubes obscure apparently single in the intervals. Collected by Mrs Joseph Clemens on Mt. Whitney Cal., alpine, also on Kearsarge Pass July 28 1910. The habit is that of the acaulescent species of Cymopterus.

Astragalus Purpusi n. sp.

Didymocarpus-Brazoensis group. A cæspitose perennial, prostrate, much branched throughout, with habit of A. lentiformis and Kentrophyta. Lower internodes very short and rather woody, upper slender and 1.5-4 cm. long, about as long as the leaves, appressed-hairy, round Stipules adnate, connate, hyaline, conspicuous, about 3 mm. long and wide, quadrangular, truncate, hairy above, the uppermost connate only above and deltoid, appressed. Leaves delicate, with filiform rachis, 1.5-4 cm. long, spreading, the small lower ones short petioled, the rest sessile, with about 10 pairs of emarginate and oval-obovate to oblanceolate thick leaflets which are petiolulate and jointed to the rachis, nearly contiguous, smooth above and folded, sparsely appressed-pubescent below, the broader ones about 2 mm. long, and the longer ones 4 mm. long and 1.5 2 mm. wide. Peduncles filiform, in the upper axils only, and ascending, as long as the leaves, with capitate and broadly ovate inflorescence only slightly elongating in fruit and compactly flowered with 10-15 light-purplish flowers 3 mm. long. Bracts minute, not 1 mm. long, ovate, hyaline, a little longer than the flowering and about as long as the fruiting pedicels, persistent. Calyx obconic, equally inserted, appressed-black-hairy, tube about 1 mm. long; teeth triangular, nearly equal, erect, half as long as tube. Banner obovate, about 2 mm. long, abruptly arched to 90° at calyx tips, purple and dark-striped, slightly longer than the broadly-linear nearly straight and blunt and white or purple wings. Keel very broad, straight, the tip rounded to a little more than ½ circle and with the minute tip erect. Pods on a stipe nearly as long as the calyx, pendent on a reflexed pedicel, obliquely ovate, shortly acute at both ends, conspicuously flattened laterally, with triquetrous cross section, ventral suture slightly arched and raised, the dorsal impressed ½ the width of the pod and then continued

to the ventral as a partition and making the pod 2-celled (a single seed in each cell), pod 4-5 mm. long, about 2 mm. wide, minutely appressed-pubescent, papery and rather strongly nerved. Sierra de Parras, Coahuila Mexico, July 1910, 9,000 ft. alt., C. A. Purpus.

Astragalus Pueblæ n. sp.

Stems filiform and several to many, much branched throughout from an apparently perennial root, widely spreading or decumbent after the fashion of A. Nuttallianus and much resembling it in habit. Stipules adnate, not connate, rather large, triangular, green. Leaves filiform, 5-7 cm. long, ashy with short and appressed hairs, lax. Leaflets 4-5 pairs, about 1 cm. long and 1 mm. wide, folded, linear, petiolulate, the pairs distant about their own length, Petioles $\frac{1}{4}$-$\frac{1}{3}$ the whole. Peduncles nearly erect, about as long as the leaves, filiform, ending in a dense round head of about 10 reflexed flowers. Bracts minute, scarious, persistent. Pedicels filiform, about 2 mm. long, reflexed with age, black-hairy with short and appressed hairs like the calyx. Calyx campanulate or obconic, not noticeably oblique nor compressed, about 2 mm. long, the narrowly triangular teeth about half as long and erect, the lower teeth somewhat the longer. Flowers about 5 mm. long, broad. Banner white, broadly oblong and strongly notched, with closely reflexed sides, about 3.5 mm. long, arched to 45° abruptly at calyx tips. wings obliquely ovate, large for the flower, about 1 mm wide and 1 mm. longer than the keel, purple-tipped. Keel a little declined, $\frac{1}{2}$-deltoid-ovate, about 2 mm. long, purple, the straight not erect tip very broad and barely acute. Pods sessile, brodaly linear, a little wider above, about, 8 mm. long, 3 mm. wide and hardly 1 mm. thick, laterally much compressed, papery, not inflated, deltoid-apiculate, rounded at both ends. somewhat canescent with minute white hairs, cross section cordate-triangular, both sutures prominent but not produced (pod wholly 1-celleb), ventral suture straight to near the tip then convex, dorsal suture inflexed $\frac{1}{3}$-$\frac{1}{2}$ by a strong sulcus which stops short of tip of pod. This belongs to the parvus group. No. 5645 Purpus, Esperanza, Pueblo Mexico, Sept. 1911.

Pentstemon aboriginum. P. calcareus Jones Cont 12 69, not Brandegee.

Asclepias Tapalpana. A. Jaliscana Jones Cont. 12 49, not A. Jaliscana Robnison. A friend has called my attention to these duplications.

ARABIS.

A recent examination of this genus in the light of Watson's

revision in the Synopt. Flora shows that his work could hardly be worse. A fairly successful move was the grouping into Sisymbrina and Euarabis, but there it ends. The rest of the grouping rests on stellate pubescence when there is none in the genus, on the variable earing at the base of the leaves, and on the arrangement of the seeds in one or two rows, when everyone knows the seeds are always in two rows. If the pods are very narrow or about 1 mm. wide the seeds mostly appear in one row, but as pods of the same plant sometimes vary 3 mm. in width the seeds are in all degrees of variance as to rows. This wholly unspecific distinction is seized upon by Greene and Nelson as a fruitful source of fictitious species. Another very poor character adopted by Watson (and carried to an absurdity by Greene and Nelson) is the development of ears. Careful field work shows that you can get almost any kind of earing in the same patch of plants; that perennials often bloom the second year; that too little attention has been given to the endurance of species; that too much has been made of the acumination of the pod (except in the arcuata group), the same species varying from acuminate to blunt; that too little has been made of the size of the seeds; and that rows of seeds and so-called "stellate pubescence" are misleading. As a result of Watson's method we know there is an incongruous mass of species on pages 161-2-3 (Synopt. Fl.), while A. Breweri, which belongs with it, is far removed, and A. platysperma with seeds decidedly in two rows is left in it and far removed from suffrutescens, confinis, Lyallii and Drummondii its nearest allies. A. Parishii and Cusickii are side by side though not related. A. microphylla, canescens and Lemmoni are much separated but closely related. A. Cusickii, Beckwithii, subpinnatifida and Holbœllii are widely separated though closely related. A. pulchra and arcuata are widely separated but closely related. The chief character of pulchra is not noted, namely, that its pods are cylindrical till mature, arcuata shows the same varyingly A. arcuata and Holbœllii are the most troublesome species and though treated perhaps as well as can be done they are not satisfactory. We have no evidence what the type of Holbœllii is, can judge only by geographical limitation. The looseness in describing species of Arabis by Watson is the chief cause of our present difficulties. He always considered the Cruciferæ a specially "natural" family which was his way of saying that the distinctions were artificial. In 1882 when I had carefully worked up in the field the western Nevada forms he referred all my material to old species (including my then unpublished A. pulchra). I refrained from publishing my A . pulchra on the express understan-

ding that my name would be respected if he found it was surely new when he came to revise the genus. Later on he kept the pact and also made new species out of three or four others! This and similar occurrences jarred my confidence in the great superiority of the judgment of any closet botanist. Watson I still consider one of America's four (Gray, Engelmann, Torrey, Watson in order of ability, and amount of work) greatest botanists, but he did not work up to his normal standard in Arabis, probably from lack of material as well as field study. An item pointing this way is in at least three species where he gives the pod only $\frac{1}{3}$ as long as it is, and pedicels of A. pulchra are given as $\frac{3}{4}$ line long instead of 3-4 lines long, etc., the latter may be a clerical error. It is not my intion to publish a revision of the genus just now, but rather to describe some forms that appear new.

Arabis Brucæ n. sp.

Related to Holbœllii. Cæspitose perennial from a long and erect tap root. Crowns about 6 mm. thick, densely covered with many rosulate root leaves which are 4.6 cm. long and linear-oblanceolate, acutely slender-petioled, entire, acutish, thin, about 5 mm. wide. Stem leaves narrowly oblong, not reduced above, about 1 cm. long and 3 mm. wide, obtuse, sessile except the lowest, not auricled. Stems with inflorescence 1.5 dm. long, slender, erect, few, arising from the side of the crown. Inflorescence not fully developed, the upper part still in flower, deltoid in outline. Lower pedicels elongating, ascending, 1.5 cm. long, slender; the upper floral ones 2-3 mm. long. Pods smooth, relatively few-seeded, strict, about 6 cm. long and $\frac{3}{4}$ mm. wide, shortly acuminate but stigma nearly sessile, seeds appearing nearly in a single row. Flowers bright-pink, 1 cm. long. Petals oblanceolate to spatulate, about 3 times the greenish sepals. Whole plant smooth, with the appearance of a Cardamine. Hills near Davis Creek Cal., June 1898, in flower only, part of Mrs. Bruce's No. 2251. Summit Cal. Nevada Co. July 10, 1902 Jones, fruit not fully mature.

Arabis salubris n. sp.

Densely cæspitose perennial, hoary throughout, except the pod with compact and much branched short hairs (pods smooth). The crowns rather woody nearly round with many thick and linear-oblanceolate and entire leaves acute at tip and with short and narrow petioles. Root leaves 2-3 cm. long and 3 mm. wide. Stem leaves slightly reduced above, broadly linear, acute, entire, the uppermost only with minute ears, sessile, about 2 cm. long and 3 mm wide. Stems about 1.5 dm. long, erect stout below, mostly paniculately branched. Pedicels stout, ascending, at maturity a-

bout 1 cm. long, 2-5 mm. long in flower. Pods about 5 cm. long and 1 mm. wide, the seeds appearing slightly in 2 rows and narrowly winged, the central nerve going nearly to the tip but the lateral ones faint, pod very flat, with triangular tip and sessile stigma, nearly erect. Flowers purple, erect, about 5 mm. long, the oblanceolate petals about ½ longer than the dark-purple sepals which as in the rest of the genus are oblong and rounded and with narrow hyaline margin, sepals less hoary than the leaves. This appears near A Parishii. It grows with A. pulchra on hot mesas at Pleasant Canon Argus Mts. Cal. Tropical Life Zone. May 6 1897 Jones.

Arabis Bridgeri n. sp.

Cæspitose perennial, with several small crowns from a woody and shortly-branched root, with the habit of a Cardamine but not growing in moist ground, and belonging to the A. hirsuta group. Root leaves several to each crown, from nearly oval to spatulate, obtuse and rounded, entire or rarely dentate, thickish, flat, on slender petioles, about 2 cm. long, the blade about ½ the whole, sparingly ciliate with coarse and simple acicular hairs, the surface minutely granular, about 1 cm. wide. Stem leaves sessile, oblanceolate to narrowly elliptical, obtuse, only the uppermost minutely and acutely eared. Stems stout, erect, about 1 dm. long including the narrow inflorescence which is over ½ the whole. Pedicels in fruit about 1 cm. long, stout, ascending. Pods erect, strict, 2 cm. long and barely 1.5 mm. wide, shining, nerved to the tip and with prominent lateral nerves, few-seeded; seeds appearing in one row oblong, wingless, large. Tip of pod acuminate and style 1 mm. long. Flowers gone. This is probably the A. furcata reported by Rydberg from this region. Mt Bridger Montana, alpine, Aug. 10 1905, Jones

Arabis Diehlii n. sp.

A tufted but short-lived perennial and spreading to decumbent from a simple and erect tap root; crowns few. Stems coming from the side, slender, about 1 dm. high, arcuate and tapering. Root leaves very many, entire, thick, strongly nerved, acutish, 3-4 mm. wide, about 2 cm. long or less, the oblanceolate blade fully ½ the whole, strongly beset with very rough hairs which are very coarse, curved, acicular, white and mostly simple. Uppermost stem leaves with rather square and sessile bases but not eared, narrowly oblong, acute, and with the stem and calyx less pubescent than the leaves. Mature pedicels slender to rather stout, 3-8 mm. long, ascending or the tip a little reflexed. Pods declined but not pendent, arcuate, inclined to be a trifle larger above, 2.5 cm. long and

about 2 mm. wide. triangular-acute with sessile stigma, very flat, with seeds conspicuously in two rows and many and small. Flowers about 5 mm. long, erect, light-colored. Petals oblanceolate, about twice the purplish sepals. Subalpine on dry ridges of Mt. Belknap Utah, June 1898-9. To this I would refer material from Santa Fee N. M. by I. E. Diehl, but this has much narrower and longer pods, longer pedicels, and may be A. Fendleri.

Arabis lignifera Nelson. I had given this another name. It is a loosely cæspitose perennial with small crowns and rather woody but short branches of the slender and erect tap root. Stems about 1 dm. long, filiform, ascending and simple from the base of the crown and independent of the sterile and leafy crown adjoining which becomes the stem producer of the next year. Leaves spatulate to oblanceolate, thick, with evident midrib, about 1.5 cm. long, acutish, entire, about 3 mm. wide, densely pubescent with compact and much-branched minute hairs, the slender petiole as long as the blade. Stem leaves narrowly oblong, acute, sessile, the upper ones smooth and minutely and acutely eared, about 1 cm. long. Upper part of stem naked. Flowers few, about 5 mm. long, light-colored. the petals purplish and about twice as long as the sepals. Pedicels nearly 3 mm. long, ascending but arcuate at tip so that the arcuate pod is nearly pendent or rarely horizontal. Pods rarely over 3-4 at the end of the peduncles, about 3 cm. long, 1.5 mm. wide, shortly acute with sessile stigma, very flat. seeds rather few, oval, appearing as if in a single row, very narrowly winged. Alpine on the high peaks of the Wasatch and Uintas. I refer here also material from Upper Marias Pass, MacDougal Pk. and Blackfoot Glacier. Montana, Jones, but these have broader leaves and more woody stems.

Cymopterus corrugatus var. scopulicola n. var.

A close ally to C. globosus also, and like it with deep-seated, erect and tuberous fusiform roots, mostly with a single crown. Leaves leathery, rather glaucous. Flowers white, opening in very early spring, the fruit maturing in May. Root 9-15 cm. long and about 1,5 cm. wide, crowned by several hyaline sheaths from which the purple and slender and mostly single stems arise 2-10 cm. long and just reaching the surface. Leaves flat on the ground, 2-4 cm. long, ovate in outline, longer than the rather stout and purple petioles, pinnately 5-lobed or incised with the lowest pair of lobes almost distinct and contiguous, the lobes again unequally and incisely and crenately cut or toothed, the tips of the teeth very obtuse and broad and minutely apiculate. Fruiting peduncles purple, rather slender, not longer than the leaves, prostrate. Flowers

in a small and compact cluster, in fruit the umbels are somewhat unilateral by the upper rays being longer (4-7 mm.) than the lower, all fleshy and thick. Involucre none. Involucels of about 5 nearly distinct purple bractlets, 3 4 mm. long, oblanceolate and acute, with narrow hyaline margin. Fruit from nearly sessile to shortly-pediceled, about 6 mm. long and 4 mm. wide from the outside of the wings the outline being cylindrical to oval and emarginate at each end; body of seed flat though slightly concave on the inner face, narrowly elliptical and acute at both ends, about $\frac{1}{4}$ mm. thick and 1.5 mm. wide, with 2 oil tubes on the commissure and about 1 in the intervals. Wings greatly crimped, very cellular-corky, about 1.5 mm. wide to the end of the seed, all about equal or one or two of the dorsal ones very thin but wide, the cross section being lanceolate from the base which is about as wide as the seed ($\frac{1}{4}$ mm.) and the tip a knife edge. This differs from the species in being much more condensed, the fruit forming a compact head, rays few and very short, in the entire bractlets not acuminate nor toothed, and in the much less dissected and smaller leaf. It differs from the var. Coulteri in the few and very short rays and still less dissected and smaller leaves. It grows on rocky mesas or high ridges in the Lower Temperate Life Zone near Sevier Bridge Utah, about 5 miles from the type locality of the var. Coulteri, in sandy or gravelly soil along with C. longipes. May 26 1910. This trip was a special one to re-collect the var. Coulteri which grew on clay slopes, but it was not found though many of this var. were.

Arabis sabulosa n. sp.

Strict biennial, 1-2 ft. high. Whole plant hoary with compactly and pectinately divided and appressed hairs. Root leaves many, rosulate, oblanceolate, mostly with a few coarse teeth, 1.5-4 cm. long, 3-4 mm. wide. Stem leaves densely imbricated so as to conceal the stem, sagittate, oblong-lanceolate, acute, entire or the lower with a few teeth, 6-15 mm. wide, appressed. Inflorescence mostly panicled and with the central raceme twice longer and sessile. Pods 6-7 cm. long, 2 mm. wide, flat, many-veined, obtuse at both ends, a little arcuate, appressed and reflexed with the pedicels also closely reflexed and in fruit about 4 mm. long. Seeds appearing as if in one row. Flowers 8-10 mm. long, white or whitish and with pink sepals, reflexed. Petas spatulate to oblanceolate, with the claws about twice the sepals which are narrowly elliptical often and with narrow hyaline margins. Plants many-flowered. Sagebrush plains from Palisade to Cobre Nevada, Lower Temperate Life Zone.

Arabis sabulosa var. frigida n. var.

This has the pectinate stem leaves nearly like A. subpinnatifida and linear-oblanceolate rosulate root leaves 1.5-3 cm. long, the stem leaves barely auricled. Plants ½-1 ft. high. Top of Diamond Peak, Cal. June 28 1897, nearly alpine, Jones. Flowers barely 8 mm. long.

Arabis sabulosa var. colorata n. var.

Flowers purple, 12-18 mm. long. Petals 3-4 mm. wide, fully 3 times the sepals, including the short claws. Sepals linear elliptical, obtuse, very narrowly margined. 4-5 mm. long, colored. Pedicels slender, 10-12 mm. long, closely reflexed except in youngest flowers. Pods appressed, straight, 4-5 cm. long, barely 2 mm. wide, slightly narrowed at tip. Internodes about ⅓ the leaves which are barely auricled above. Stem leaves 4-6 mm. wide, 2-3 cm. long. Root leaves linear-oblanceolate, mostly entire, as are the stem leaves. Whole plant greener. This approaches A. Holbœllii. Summit, Owen's Valley, Cal. to Weiser Idaho and northwestward.

Arabis pulchra Jones. As I have said above the young pods are round and gradually flatten as they mature till at length they are 3 mm. wide and 1 mm. thick, strongly nerved ⅔ the way toward the tip and with many ascending veinlets starting from the sides and often uniting as pseudo-lateral nerves. The young pods are white with repeatedly forked fine hairs, and gradually become nearly smooth with age, they are conspicuously truncate when young and without any constriction; the stigmatic knob remains to the end, the mature pod becoming shortly-triangular with the knob slightly separated from the rest by a minute neck. Th flowers as they mature become reflexed by the pedicel turning down, at maturity the stout pedicels are closely reflexed and forming a nearly straight line with the pods which are only slightly arcuate and 4-5 cm. long on pedicels 10-15 mm. long in fruit (a little less in flower). The raceme is strict and mostly unbranched. Rarely is even the stem branched at the base in the second year (it flowers the second year), in older plants there are often several herbaceous ones form the woody base which is often 2 ft. long and 7 mm. thick and with a bark. Naturally the herbaceous part is 1.5-2 ft. high. The pubescence is short and close, never strigose. Flowers bright-purple, about 10 mm. long. Petals spatulate-oblanceolate and with the claws twice the elliptical and rounded sepals which are hoary and with narrow purple hyaline margins. Leaves all entire. The root leaves slender, oblanceolate, petioled, 5-8 cm. long, acutish. Stem leaves mostly broadly linear, closely sessile, and the upper ones often with small auricles, 3-5 mm. wide, somewhat reduced above, thick. The type was gathered at Empire City Nev.

and grows in the lower part of the Lower Temperate Life Zone on sagebrush mesas, the species extends from northern Nevada along the eastern base of the Sierras at least as far as San Felipe near the Mexican border, also eastward as far as Goldfield, Tonopah and Death Valley, but farther eastward is replaced by the var. Munciensis, and northward by A. arcuata. All material from Oregon referred here and seen by me is A. arcuata. The seeds are clearly in two rows.

Arabis pulchra var. Munciensis n. var.

Flowers about 8 mm. long. Petals nearly obovate, purple. Pods not appressed, pendent on nearly horizontal pedicels, 2-2.5 mm. wide. All the upper leaves auricled, the lowest less so and nearly obovate-spatulate, 1.5-3 cm. long. Eastern Nevada from near Ibapa western Utah and westward. This looks like a hybrid between arcuata and pulchra, but neither parent grows with it.

Arabis pulchra var. pallens n. var.

Flowers nearly white, about 10 mm. long. Petals broadly oblanceolate, more than twice the sepals. Pedicels about 5 mm. long, reflexed and with the pendent pods rather appressed and 2 mm. wide and with a distinct thick beak longer than the width of the stigma. Leaves all linear or very narrow, not auricled. This is the only form in the Navajo Basin. First collected by me in 1883. It extends from Price to Grand Junction.

MONTANA BOTANY NOTES,

Additions.

During the season of 1910, in company with Prof. M. J. Elrod Director of the Biological Station and Prof. Kirkwood, I made a tour of the Glacier Natl. Park. We reached Somers on the beautiful Flathead Lake on July 31st. A day was spent there and an Opuntia was collected which Dr. Rose has described as new (but which I regard as only a small form of O. mesacantha) and some other plants new to the region. We all reached McDonald Lake Aug. 1st. The object of this trip was to complete the examination begun in 1909. In that year we visited the lake, Sperry Glacier, the Continental Divide, and Gunsight Pass and Lake and Blackfoot Glacier, on the Hudson Bay slope. In 1910 we spent four days at Avalanche Lake, about a week at Mineral Park and Swift Current Pass (Continental Divide), thence over on the Hudson Bay slope to Waterton Lake just on the British line, thence over Brown Pass to Bowman Lake and Adair, thence southward to McDonald Lake. The trip took a month. The botanical work was thorough till we dropped down toward Waterton Lake; from there the trip was too hurried. Good moss collections were made at McDonald Lake, Mineral Park and Greenwood's Camp near Waterton Lake only. Little was done with lichens or fungi except to get anything noticeably different. Hydna were collected, several species but not identified. Messers Holzinger, Fink and Peck named species as before.

Mosses.

Sphagnum undulatum var. teretiusculme x flavescens Roell. Waterton Lake.

Wilsoni var. quinquefarium forma humile Roell. Mineral Park.

Dichodontium pellucidum Sch. Greenwood's Camp.

Dicranum Bonjeanum De Not. Greenwood's Camp, Waterton Lake.

fragillifolium Lindb. McDonald Lake.

fuscescens Turn. McDonald Lake, Mineral Park, Waterton Lake, Brown Pass.

longifolium Hedw Avalanche Lake, Swift Current Pass, Greenwood's Camp.

scoparium Hedw. Avalanche Lake, Brown Pass.

Dicranum montanum Hedw. Greenwood's Camp.
crispulum Lindb. Greenwood's Camp.
congestum Brid. Greenwood's Camp.
brachyphyllum Ren. & Card. Mineral Park.
Ceratodon purpureum (L.) Brid. Waterton Lake, Greenwood's Camp.
Rhacomitrium canescens Brid. Mineral Park, Greenwood's Camp.
heterostichum Brid. Greenwood's Camp.
patens Hub. Avalanche Lake, Greenwood's Camp.
Sudeticum R. S. Mineral Park, Greenwood's Camp.
Hedwigia ciliata (Dicks.) Ehrh. Avalanche Lake.
Encalypta commutata N. & H. Alpine at Mineral Park.
Orthotrichum speciosum Nees. Waterton Lake.
Tetraphis pellucida Hedw. McDonald Lake, Avalanche Lake
Funaria hygrometrica (L.) Hedw. Greenwood's Camp.
Bartramia ithyphylla Brid. Mineral Park.
Philonotis fontana Brid. Mineral Park.
new species, not named. Alpine, Swift Current Pass.
Webera nutans Hedw. Avalanche Lake, Greenwood's Camp.
Bryum pallens Sw. Mineral Park.
crispulum Hampe. This very rare alpine species was found at Mineral Park. Heretofore found only arctic in America and in Norway.
pseudotriquetrum Schw. Mineral Park.
Mnium spinulosum B. S. Greenwood's Camp.
punctatum Hedw. McDonald and Avalanche lakes.
serratum Laich. Mineral Park, Waterton Lake.
Aulacomnium androgynum Schw. Mineral Park.
papillosum L. & J. Mineral Park, Bowman Lake.
Timmia austriaca Hedw. Avalanche Lake.
austriaca var. brevifolia R. & C. Waterton Lake.
Pogonatum alpinum Roehl. Mineral Park.
Polytrichum juniperinum (Hedw.) Willd. Avalanche and Waterton lakes, Greenwood's Camp
sexangulare Flœrke. Mineral Park.
commune var. minus Weis. Mineral Park.
pruinosum Hedw. Mineral Park.
Climacium dendroideum (L.) W. & M. Waterton Lake.
Tortula pseudoaciphylla (Kindb.) Brot. Avalanche Lake.
Pseudoleskea pallida Best. Mineral Park.
radicosa (Mull.) L. & J. McDonald Lake.
Hypnum ochraceum Turn. Mineral Park.

Hypnum Schreberi Willd. Avalanche Lake, Greenwood's Camp.
symmetricum R. & C. McDonald Lake.
crista-castrensis L. Avalanche Lake, Greenwood's Camp.
filicinum L. Greenwood's Camp.
turgescens Sch. Mineral Park, alpine.
stellatum Sch. Avalanche Lake.
Richardsoni L. & J. Greenwood's Camp.
Hylacomium robustum var. Jonesii C. & H. n. var. Mineral Park.
Webera cruda x Aulacomnium androgynum. McDonald Lake.

Hepaticae.

Blepharostoma trichophyllum (L.) Dumort. McDonald Lake.
Jungermannia cordifolia Hook. Mineral Park.
lanceolata. McDonald Lake.
Lophoria porphyroleuca. Avalanche Lake, McDonald Lake.
Baueriana. Swift Current Pass, Greenwood's Camp.
incisa. McDonald Lake.
Porella rivularis (Nees) Trev. Mineral Park, Somers.
Ptilidium ciliare (L.) Nees. McDonald Lake.
pulcherrimum. Greenwood's Camp.
Plagiochila ospleoides. McDonald Lake.
Marchantia polymorpha L. Greenwood's Camp.

Lichens.

Alectoria Fremonti Tuck. Rogers's Ranch.
circinata Fr. Avalanche Lake, Mineral Park.
Cetraria glauca (L.) Ach. Somers.
Islandica var. crispa Ach. Greenwood's Camp.
Cladonia fimbriata (L.) Fr. and var. simplex. Waterton Lake
gracilescens (Rab.) Weimo. Swift Current Pass.
pyxidata (L.) Fr. Greenwood's Camp.
gracilis var dilacrata Flœrke. Greenwood's Camp, Avalanche Lake.
cariosa (Ach.) Spreng. Waterton Lake.
var. aspera Flœrke. Greenwood's Camp, Waterton Lake.
Evernia vulpina (L.) Ach. Brown Pass.
Parmelia olivacea (M.) Ach. Somers.
physodes (L.) Ach. McDonald Lake.
saxatilis (L.) Fr. Somers, McDonald Lake.

Peltigera aphthosa (L.) Hoffm. Avalanche Lake.
spuria Ach. Waterton Lake.
canina (L.) Hoffm. McDonald Lake.
Solorina crocea (L.) Sch. Swift Current Pass.
Sticta pulmonaris (L.) Ach. McDonald Lake.
Usnea barbata (L.) Fr. McDonald Lake.
Rhizocarpon oidoleum var. penicrum (Tuck.) Fink. McDonald Lake.
geographicum (L.) DC. Avalanche Lake.
Theloschistes polocarpus (Hoffm.) Tuck. Somers.
Nephroma lævigatum var. parile Tuck ? Greenwood's Camp.

Fungi.

Fungi were as scarce as they were abundant the first year.
Cintractia Caricis (Pers.) Magn., on Carex Montanensis. Mineral Park.
Peridermium Balsamineum Peck. Avalanche Lake.
occidentale Arthur. Avalanche Lake.
Erysiphe cichoriacearum DC. On Aster conspicuus. Waterton Lake.
Puccinia aberrans Peck. Mineral Park, Swift Current Pass.
Omphalia campanella. Avalanche Lake.
Uredinopsis Cepelandi Syd., on Aspidium Filix-Mas. Avalanche Lake
Uromyces ———. On Clintonia borealis. McDonald Lake.

Higher Plants.

Tsuga Mertensiana (Bong.) Carr. was collected by Prof Kirkwood in the Idaho strip on the edge of Montana, and by myself again in the Cascades in subalpine places. Its general appearance is that of the larch or a ragged spruce, not at all that of the other graceful hemlock.
Equisetum sylvaticum L. Avalanche Lake, Greenwood's Camp.
Agrostis ampla Hitchk. ? Avalanche Lake.
Bromus inermis Leyss. Greenwood's Camp.
vulgaris var. eximius Shear. Waterton Lake.
erectus Huds. Mineral Park.
Danthonia thermalis Scr. Mineral Park.
Carex saxatilia L. Bowman Lake.
amplifolia Boott. Mineral Park.

Tofielda palustris Huds. Blackfoot Glacier.

Allium stellatum Fras. Flathead Lake, Elrod, 1905.

Ranunculus ramulosus n. sp.

Alpine and cæspitose perennial, with fibrous roots. Crowns very short and erect. Root leaves reniform, leathery, with the blade about ¼ the petiole, 2.5 cm. wide, 3-cleft to the middle and with the lobes 3-cleft or crenate, these leaves mostly 6-8-lobed with all lobes rounded, oval to obovate, smooth, venose. Stems nearly filiform, decumbent or straggling, with 1-2 leaves near or above the middle, these leaves 3-5-cleft and with sessile to petioled oblanceolate and obtuse lobes 1-2.5 cm. long. Peduncles flexuous, filiform, often bracteate in the middle, 2.5-13 cm. long. Flowers small, yellow. Heads oblong, small. Akenes half-oval, rather sharply ribbed on the edges and a little flattened, with very short beak hooked and not ¼ the whole. Plant entirely smooth. Petals oblanceolate, longer than sepals. This differs from R. Eschscholtzii in the reniform and nearly equally crenate-lobed and leathery leaves with obtuse and not acute tips, and the very short hooked beak. Swift Current Pass.

Arabis lignifera Nelson. Alpine, Mineral Park.

Spraguea umbellata Torr. Mt. Haggin.

Elatine brachysperma is Callitriche. (See Notes).

Stipa spartea var. Tweedyi (Scr.) Jones. Eastern Montana to Flathead Lake.

Juncus castaneus Sm. Brown Pass.

Regelii Buch. Lone Pine.

Romanzoffia Sitchensis Bong. Alpine. Mineral Park, Sperry and Blackfoot glaciers and Lambert valley on McDonald peak.

Vaccinium membranaceum is misnamed since the leaves are membranous only when young.

Myrtillus L. Waterton Lake.

Gaultheria Myrsinites Hook. (humifusum (Graham) Rydb.) Mineral Park.

Erigeron alpinus L. Mineral Park.

The following interesting plants, among others, were collected by Prof. M. J. Elrod in the Park in 1911.

Dodecatheon pauciflorum Greene. Iceberg Lake.

Omphalodes Howardi Gray. Brown Pass.

SEXTUPLE BOTANY.

They say that there is nothing new under the sun, but this is a delusion of the ancients.

Rydberg, in Torr. Bull. Vol. 37 in commenting on Nelson's Coulter's Flora, says that he thinks no genus should contain more than six species, his conception of species being meant of course.

This great pronouncement effectually eclipses that wonderful Brittonio-Covillean emanation "Once a synonym always a synonym", while Greene with his multitudinous Eschscholtzias and dogbanes is relegated to the race suicide class. It is too bad to so ruthlessly and suddenly snatch from him this malodorous supremacy and at a time when advancing years and the tremendous handicap of absence of any access to that Ponce de Leon fountain of metropolitan botanical inspiration makes a suitable defense impossible. There ought to be some statute covering the case. He might invoke the law against cruelty to animals (and would receive the support of all systematic botanists), or the antitrust law, cornering botanical inspiration. Or failing in that Greene could tackle Astragalus and, if his work on Eschscholtzia and Apocynum is any index, he could make over half a million species and so work Rydberg's sextuple genera to death. What a frightful drain all this would be on the already much-abused Latin and Greek.

Since Rydberg would get the worst of it we should all rush to his aid. There are at least twenty fairly good varieties of Astragalus lentiginosus which he would make into species, it would be a good idea to keep a string on them to prevent their being lost in the shuffle when they are "segregated" into half a dozen or more new genera, and in addition we should by all means properly perpetuate the memory of these great botanical creators.

My system would work out like this for A. lentiginosus var. Coulteri (Gray) Jones.—— Rybergia-Astragalo-lentiginosa Coulteri (Gray) Rydberg. After Greene had taken a whack at the var. and made a few hundred species out of it Rydberg would have to take a second hitch at it and one of the new names would be this RydbergiaxGreenea-Astragalo-lentiginoso-Coultera septem-bughola (Greene) Rydberg.

GREENE AND HIS SPECIES.

In a brochure of not long ago E. L. Greene complains of the way the botanical public has received his proposed new species, intimating personal prejudice. He shows that in certain cases he is no worse than Coulter, Fernald, Rydberg, Nelson and others, and he goes to great length to quote new species, proving that many authors have greatly increased the species in floras over the plants recognized a generation ago. This kind of special pleading is always the stock argument when a man is wrong. Because Fernald and Coulter got in the mud over their shoe tops and Greene and Rydberg over their heads is no proof that the former are muddy and the latter clean. Because a generation ago half of the flora was almost unknown is no evidence that the present increase of species is due to changed views among real botanists as to specific limitations. Greene is always side-stepping the main issue, which is this, Do his species represent stable plant forms, or are they individual variations? We who study our plants as they grow in the field and by thousands know that 95% of his species have no foundation in fact, and no amount of botanical juggling or dust throwing can obscure that fact. The indictment western botanists bring against him is that he is grossly ignorant of primary facts in plant ecology or deliberately dishonest. His work on Eschscholtzia and Apocynum is the acme of botanical drivel, as every one but himself knows, and differs in no essential particular from a typhoid fever patient in the last stages picking at the bedding. As to personal prejudice it is unfortunate that one's most intimate acquaintances say the hardest things. The private character of a man is a real part of his scientific character for on that depends his reliability. If a person says as Greene did before he left California that he would devote the rest of his life to undo the work of Asa Gray, he has no one but himself to blame if the botanical public sees in that an adequate explanation for his erratic treatment of Grayan genera and species. That Gray, the greatest botanist this country ever knew, overestimated his closet kowledge of western plants is now generally accepted, but his autocratic work in trying to suppress the publication of new species by Greene and myself is not so well known, but it is a fact. The files of the Torrey Bulletin and Botanical Gazette in the eighties will show that both journals were as subservient as the former became flagrantly insurgent after the death of Gray and Watson, for they published

a compact that they would publish no new species unless the types were deposited in some of the eastern herbaria, but in private they went much farther. I was publishing in both journals. I received a letter after my last article in the Bulletin (from Gerard the Editor) saying that Gray had objected to my new species as not authorized by him, and that I should get his approval hereafter. I replied that I would submit to the dictation of nobody. I did not feel hostile to anyone though I felt that it was pusillanimous and the publication of the compact later was equally so in both journals. The compact made my herbarium valueless as to types and insured the easy access to them by closet men and made it imperative for us to make expensive pilgrimages 2000 miles to see types which the closet botanists did not know how to describe. The private orders required Gray's approval and gave Harvard the types, a fine thing —— for Harvard. After a while Columbia eased up a bit and let Greene publish without Gray's approval on depositing types with them. I did not publish or attempt to for some time but I kept up my correspondence with Gray and Watson and they published as mine any species to which I gave a name if they thought it was good. I had many friendly tilts but I knew they were often loose in their descriptions, and so I could not be sure of my ground till I saw their types, which did not occur till 1895 when both were dead.

From Gray's viewpoint we were enthusiastic collectors like Cusick, Lemmon and many others who sent him much material, and for whom among others he was running a race with Death to complete his great Flora. In addition we knew his types from meagre and often faulty descriptions, and consequently made errors constantly. On our part we were not satisfied with all his names for we knew that he erred in describing his types or in his identifications. This was hightened when Watson adopted my opinion on Arabis and got the credit for half a dozen species that by right belonged to me.

Because of these facts one of us has lost his botanical moorings and drifted out into the fog, and it is pitiable, still more so because he is writing a history of American botany where he can fatten his spleen on unfair references and belittling estimates of at least one of the World's greatest botanists.

THE COLUMBIA BASIN.

In my work of unraveling the ecological facts of the Flathead Lake region and western Montana some problems arose that I could not solve there. It was established that the flora is almost identical with that of the Blue Mts. of Oregon and the Cascades though separated by the enormous barrier of the Columbia plains, a barrier that in the Great Basin would make marked changes in the flora. A dubious explanation was possible in that much overworked theory of migration, around by the Blue Mts. and the Selkirks, a slow process. Another disturbing geological problem was the origin of the lake beaches so high up, at least 4200 ft. alt., the base level being hardly 3000 ft., which has not been satisfactorily explained by Montana geologists. They have assumed a great rock slide in the canon below Missoula or a glacial moraine damming back the water, but neither occurred, and in addition the same beaches are found at the same level outside the Bitterroot in the Flathead and Little Bitterroot and down the Missoula valley to Thompson Falls where it debouches into the Columbia Basin proper. I had no chance to carry the problem farther till 1911 when I traversed the whole Columbia Basin twice as far as Chopaka Peak in the Cascades. I went from Pocatello Idaho down Snake river valley, around the Blue Mts. to Spokane, thence to the British border and along it to Oroville and Chopaka, thence down the Okanogan and Columbia to Lake Chelan and Wenatchee.

Throughout the Columbia Basin at the north enormous glaciers filled all valleys and the ice sheet capped most of the mountains as is shown by the scorings going straight over the hills. This insured the presence of a long line of great terminal moraines west of Spokane under normal conditions. At Oroville, though less than 100 ft. alt. the glaciers had debouched far to the southward leaving only local moraines and beautiful gems of lakes in every nook, a geological Paradise. Anticipating a great treat I descended the Okanogan toward Chelan, expecting to soon come upon the great moraines. All around were the benches even up to 4200 ft. alt., supposedly river terraces, but along the river it was sand and everywhere in bars and benches, and the farther south I went the more sand and less boulders, but no moraines terminal or lateral to speak of, and so it was all the way down the Columbia to Chelan. At Chelan Falls the Chelan glacier debouched and left

only a terrace of sand. There is but one agency that could produce such effects, a sea sufficiently deep to float off the glacial ice in bergs and filling the whole Basin and thus preventing the formation of moraines, as must have occurred otherwise. This unexpected discovery solved all problems of plant distribution in the region as well, and entirely changed the conception of Shoshone Lake, a name given to the arm of the great Columbia Lake which filled the Snake river valley from near Pocatello to Huntington Oregon. The Flathead and the Bitterroot also were arms. With this new viewpoint I was so fortunate as to retraverse the whole region, nearly, in the fall. I traced the lake beaches of the Columbia Lake from near Chopaka peak to Spokane and the Flathead arm beyond Missoula, a distance of over 1000 miles. I saw abundant evidence. There were river terraces but most of the large ones so conspicuous on the Okanogan were lake beaches as was shown by their filling all the coves where river action would be absent. This fresh water lake was wholly distinct from the Tertiary lake and did not drain away till after the close of the glacial period as is shown by the absence of moraines far up toward the head even of Chelan canon which was the longest-lived glacier. The existence of this great glacial lake explains why there is no terminal moraine at Thompson Falls, only a delta, and why there is no more erosion there than in most river (not glacial) valleys. It does away with the violent assumptions to account for the Bitterroot Lake at Missoula, for the boulder-speckled surface of the Basin and, best of all, accounts for the similarity of the flora of the Flathead, Blue Mts. and Cascades. It also explains the charter of the soil especially that overlying the Tertiary lava flows which for the most part overlie the Tertiary lake beds. It also does away with the assumption that the Tertiary lava flows near the Wallowas of eastern Oregon caused Shoshone Lake. This Columbia Lake, as I have named it, also covered the Salmon watershed and all the strings of lakes in southern British Columbia to the Fraser river.

Botanical Publications of Marcus E. Jones.

Excursion Botanique, out of print.
Ferns of the West, 30 pp. $.50.
Contributions to Western Botany No. 1, Zoe II 12-17.
Contributions to Western Botany No. 2, Zoe II 336-252. $.25.
Contributions to Western Botany No. 3, Zoe III 283-309. $.25.
Contributions to Western Botany No. 4, Zoe IV 22-54. $.50.
Contributions to Western Botany No. 5, Zoe IV 254-282. $.50.
Contributions to Western Botany No. 6, Zoe IV 366-369. $.25.
Systematic Botany, Zoe IV 374-379.
Contributions to Western Botany No. 7, Proc. Cal. Acad. Ser. 2 Vol. V 611-734. $1.50.
Contributions to Western Botany No. 8 pp. 43. $.50.
Contributions to Western Botany No. 9, Zoe V 41-57. $.25.
Contributions to Western Botany No. 10 pp. 90 and 17 plates. Allium and Nyctaginaceæ. $1.50.
Contributions to Western Botany No. II pp. 22. $.25.
Contributions to Western Botany No. 12 pp 100. $1.00.
Willow Family of the Great Plateau. $.50.
Contributions to Western Botany No. 13 pp. 87. $1.00
Montana Notes. $1.00
Contributions to Western Botany No 14 pp. 52. $.75.
Previous articles published as notes in Botanical Gazette and Bulletin of the Torrey Club are not included here as they are out of print.

581.979
J72c (72c)
no. 15

Contributions to Western Botany

No. 15

Marcus E. Jones, A. M.

JUL 19 1965

BIOLOGY

Claremont, California

Issued June 6, 1929

Return this book on or before the
Latest Date stamped below.

University of Illinois Library

JAN 9 1968

REVIEWS.

Abram's Flora of Los Angeles.

Abrams Flora p. 446. Abrams does not see that his figures are drawn correctly. Yucca brevifolia is figured as having thin perianth oblately spherical. The parts are never thin but are conspicuously fleshy and thick and oblong. Flowers never spherical, but very irregular. His figure of Yucca Mohavensis is equally bad. No such flowers are found, but they are almost exactly like those of Y. baccata, that is, pear-shaped. In his treatment of Allium I find the same lack of precision in handling the species, and little discrimination in synonymy. He shows a complete ignorance of Allium monticola Davidson which is a good species related to A. bisceptrum and always alpine, while A. Parishii, to which he refers it was got on the alkaline slopes of Cushenbury spring in the Tropical life zone, and is quite a different thing, and probably A. fimbriatum. His reference of my A. decipiens and Inyonis to A. atrorubens is equally erroneous. He has never seen the type of either. He never seems to have ever seen A. Nevadense, a very marked species, for he figures it as having a slender and straight single leaf, while the species has a stout and glaucuous involute leaf, conspicuously coiled at tip, and very marked bulb coats. He seems to know nothing about the peculiar root characters of A. bisceptrum and campanulatum. He uses no discrimination in his treatment of the serratum group, following Jepson in his error as to the identity of A. serratum, which appears to be A. peninsulare Lemmon. He keeps up the various forms in this group as species. His figure of A. acuminatum shows that he does not know the peculiar structure of the reticulations. He keeps up the untenable divisions of the Douglasii group. He does not follow any genetic system in the arrangement of species except to use my general system. He seems to know little of the root structure of any of the species or their method of reproduction which in many instances is very peculiar. Abrams is not in any proper sense a botanist, nor has he any right to attempt a flora of anything, for he has no sympathy with floriculture or flowers. His treatment is more that of a mathematician or bibliographer, and with little if any initiative. He has not made it a business to know plants in their homes or to understand the ecological conditions which govern their distribution. His Flora of Los Angeles is the poorest attempt at a text book on the plants of any region that I have ever seen.

JEPSON'S FLORA OF CALIFORNIA

This is coming out in two simultaneous forms. A full flora, supposed to be complete in all things, and an abridged school flora in one volume.

Jepson seems to be the best equipped for this work of any of the younger botanists, though not to be compared in ability with the venerable Parish nor with the Brandegees, who have just died. Jepson seems to have in the main done his task well. There are many minor things to criticise, such as incomplete symphony, omission of many proposed species, poor identification and an inclination to neglect the work of contemporaries, but in the main his work deserves and will get the proper recognition. His ideas on the nomenclature are betwixt and between, a defect. He fails to print the names of species as they were originally proposed. Those names ending in one or two i-s he generally prints with two irrespective of their etymological significance, apparently assuming that his readers know as little or less Latin than he, which is very little. He also drops the capitalization of proper names which is a serious defect. If a reader has not sense enough to study Latin I fail to see why he ever becomes a botanist. I don't think it fair to real botanists to assume that all of them are Latinistical idiots. That there are many who rightly belong in the class of half-wits who call themselves botanists does not need proof, but all botanists do not belong in the class of the feeble minded. Another defect of Jepson's is lack of knowledge of the material in the great herbaria of this country, and this leads him to make multitudinous mistakes in ecology and plant distribution. An example of his neglect of proper study of genera is shown in Draba. His Draba nivalis var. Californica is not that species. He does not mention Draba subsessilis though the type locality is Californian. He does not mention Draba incana which grows in California. He fails to name the chief character of Draba corrugata which is the conspicuously exserted stamens, which character does not occur in any other species of Draba. There are several species of Draba in the Sierras which he does not mention. Time prevents my going through his work and picking up the lapses, but they are many. On the whole his Flora is the best ever gotten out except Watson's monumental work. In Jepson's Manual P. 444 he gives Draba Lemmoni as D. Lemmonii with the accent on the "o." This plant was described as Draba Lemmoni by Watson in his Flora of California. In the Syn. Fl. p. 108 Robinson puts the accent in the wrong place by accenting the "o." Lemmon's name was not pronounced with the "o" long but short, and therefore the accent should be on the "e." That Jepson is simply negligent in the use of the "i-s" is shown by his not giving two of them in Draba Breweri. There was no regularity in the use of two or one "i-s"

by Watson or Gray but I see no reason why we should not follow the names as they were printed in the first place. On page 430 he also misspells Arabis Lemmoni. On the next he misspells Arabis perennans.

Another illustration of Jepson's carelessness is found on page 635 of his manual, where he publishes Sphaeralcea purpurea Parish (a species never published) and cites Sphaeralcea violacea Munz & Johnson (a species never published) as a synonum. Munz & Johnston published Sphaeralcea rosacea in Torr. Bull. 49 353 1922, which is this species.

On page 633 Jepson omits mention of Malvastrum Clementinum Munz & Johnston, and Malvastrum orbiculatum Greene. He also confuses Malvastrum Davidsonii and orbiculatum. Davidsonii is a tall plant ten to fifteen feet high growing in the San Fernando valley only, while he credits it to the San Gabriel mountains, where only orbiculatum grows. It should be noted that Jepson merges Malvastrum into Sphaeralcea.

On page 692 Jepson publishes Erodium circutarium and also repeats the error in his index. It should be cicutarium.

On page 871 Jepson publishes Salvia Vaseyi Jepson n. comb., but this species was published by Parish in Muhlenbergia 3 126 1907 as Salvia Vaseyi (Porter) Parish. Audibertia Vaseyi Porter Bot. Gaz. 6 207 1881.

On page 901 Jepson publishes Mohavea confertiflora Jepson n. comb. but this was first published by Heller in Muhlenbergia 8 48 1912 as Mohavea confertiflora (Bentham) Heller. Antirrhinum confertiflorum in DC. Prod. 10 592 1846. These and other numerous citations show either gross carelessness or deliberate ignoring of well known previous publications.

On page 402 Jepson makes the stock blunder, copied from the Synoptical Flora Robinson p. 90, probably where Eschscholtzia Californica is described as a perennial. A very slight acquaintance with the botanical garden would have told him that it is never a perennial but a biennial blooming the first year. I have grown the plant in my garden for six years, and know what I am writing about. If there are any perennial forms I have not yet met the person who has seen them.

All through the manual, wherever you encounter the termination "cola," Jepson invariably gives it a gender (a us or um), according to the gender of the genus. He evidently does not know that cola is a Greek masculine noun and should always end in a. P. 731 Cymopterus deserticolus. Agrapyron saxicola, Arctostaphylos glauca var. eremicola, Arenaria paludicola, Astragalus deserticolus, Calochortus Palmeri var. paludicolus, Carex praticola, tumulicola, Cymopterus deserticolus, Dendromecon rigida (mecon is neuter and the specific name should be rigidum). Eleocharis monticola, Eriogonum Siskiyouensis should end in "se," but a name that Gray should have balked at, Euphorbia arenicola, Potentilla glandu-

losa var. monticola, Sphaeralcea eremicola. Thelypodium lasiophyllum. I never have been able to understand how Greene buncoed the botanical world into placing Sisymbrium reflexum in Thelypodium. This is Thelypodium lasiophyllum. It is a Sisymbrium in every particular except that it has the septum of Thelypodium, just as Thelypodium elegans has the septum of Sisymbrium, while Thelypodium ovalifolium Rydberg has both septums on the type specimen. Greene, with his usual bluff, in Torr. Bull. 13, tried to make out that this was a typical Thelypodium, known as such to every acute botanist, which was the usual bunk he got off to strengthen a weak position, but why he made this bluff stick, even on Harvard, is a mystery..

On page 1008 Jepson makes an egregious blunder in merging Glyptopleura setulosa with G. marginata. They are conspicuously different.

Jepson's tendency to follow the aberrations of Rose & Coulter in the Umbelliferae is marked, while he goes them one better in several cases in the erection of new genera such as Oreonana which I think is better placed in Velaea. He keeps up the untenable Lomatium Raf. instead of Cogswellia. He does well in keeping up Cymopterus. He follows the vagaries of Greene in Gilia splitting. I don't like his handling of Dodecatheon.

He does not seem to know the habitat of Parishella, which is the dry beds where water collects on the deserts, but not alkaline places. It is frequent along with Lepidium flavum, on the road to Randsburg south of the railroad from Adelanto north.

Tricardia Watsoni he gives as "hill slopes and canons," which does not mean anything. It is always found growing under the protection of brush, as though eaten off elsewhere by stock, and in gravelly or sandy places on slopes, or edges of washes in dry places. Its roots resemble those of Mertensia being covered by black papery sheets or shreds. On drying it always turns black, including the lurid flowers, which are whitish below and purple edged.

In Jepson's preface he gives the current opinion about the insular flora of California, which has arisen from fantastic theories of amateur geologists. In recent years there has been a careful study hydrographic and otherwise to determine the facts in the origin of the islands. The data accumulating from these studies point rather unmistakably toward the conclusion that there never was a land connection between the islands and the shore and that the present flora is based on wind, water, and animal transportation, a slow process, and that the endemic species peculiar to the islands (which are few) are the product of such isolation. I have made several trips to the islands to secure data on this subject, and in no case have I ever found any geological evidence to warrant a land connection. The evidence to the contrary is much. There are no extensive sea beaches on any of the islands to show that there has been the assumed

emergence and subsidence of island masses, in fact there are almost no beaches at all, which shows that the emergence of the islands has been rapid and recent. Practically all the islands are volcanic or of highly altered schists and volcanic flows, indicating their cause to have been lateral pressure in ocean sediments some twenty miles out from the shore, causing the usual uplifts, foldings and metamorphoses which we see all along the ancient shore lines of the Coast ranges and the Sierras, and about all other world mountains paralleling the shore lines. The occurrence of Styrax, Lyonothamnus, Erythea, and many other genera now widely scattered over the Earth indicate the extreme age of the flora of California and the continuance of a Tropical flora in California from the Tertiary to the present. In my opinion the flora of the islands is the product of ordinary transportation agencies, and nothing else.

In the mechanical makeup of the botany the book shows the lack of expert direction in spacing and typography. Names of Families should be in larger type than genera. It would be far better to separate families by wide spaces, and by heavy faced caps at least twice as large as those of genera. Doubtless the main cause was demand for less pages in a manual already too large, but a few pages more would not make enough difference to notice. I think the use of a secondary accent in long words is nonsensical, such as Selaginellaceae, particularly where it is not consistently used. Lycopodiaceae should have had the secondary accent on "po" but there is none. There is no reason why Selaginella struthioloides should have the secondary accent on the first "i." We are informed that Dr. Bradley is authority for the pronunciation of the Latin words. If so Dr. Bradley would have difficulty in getting classical authority for accenting the first "i."

On page 409 Jepson quotes Cleomella pubescens Nutt. There never was any such species. On the preceding page he gives Cleomella obtusifolia var. pubescens Jepson n. comb. when it should have been Nelson Biol. Soc. Wash. 18 172 1905.

On page 363 he puts the accent on the wrong syllable in Scopulophila.

On page 252 he keeps up the wholly untenable Agave consociata Trelease, which has no standing at all, being A. deserti.

On page 247 Jepson fails to give any accurate description of Yucca Mohavensis and Y. baccata. Whether Y. Mohavensis is really distinct from Y. macrocarpa is yet to be determined, but the real distinguishing characters are the following: Y. Mohavensis plants with a trunk often 10 feet high and a rosette of leaves at the ends. Leaves 2-3 feet long, very concave, coarsely fibrous-margined, apple-green. Flowers mostly globose or nearly so, 2-3 inches long, white. Pods fleshy, 3-4 inches long, oblong, generally constricted in the middle cross wise. Flowers very many

in an ovate panicle on a peduncle not as long as the leaves. Plants somewhat stoloniferous and in young plants leaves little raised above the ground. Yucca baccata is very much stoloniferous, often covering many square rods, and with the trunks rarely a foot long, mostly none at all, and with a rosette of coarse, bluish-white leaves 2 feet long and shaped about as in Mohavensis and with the same coarse threads on the margins. The flowers form a rather diffuse panicle composed of distinct racemes and mostly without peduncle. Flowers pear-shaped, bluish-white, mostly 3 inches long and conspicuously tapering at base, the outer segments with a bluish and wide stripe along the middle. Fruit pulpy and about 3 ½ inches long, about as in Mohavensis but more inclined to be constricted in the middle, much infested by insects and seldom maturing. As a rule the flowers are rather scattered, rarely half as many as in Mohavensis. Mohavensis abounds from Bonelli's Ferry at the mouth of the Virgin river and up the Grand Wash to Pagumpa and westward to the Sierras in the middle of Owen's valley and southward to Lower California. Nowhere on the western slope except near the Palomar and San Diego. It goes a little farther down in the the Tropical life zone than Y. brevifolia but always grows with it. Yucca baccata does not reach the Sierras at any place. Its westermost locality seems to be the southern side of the Providence mountains, where it occurs along with Mohavensis and clearly hybridizes with it there. Then it extends eastward to the La Sal mountains. Utah, where it extends up into the Middle Temperate, thence southeastward to the Rio Grande valley and southward throughout Arizona and into Mexico. Mostly Tropical. Trelease in his work on Yucca p. 185 and following speaks of this species as abounding at "San Bernardina and southweard" where it does not exist. All his reference to this species is Yucca Mohavensis. Also his figure of Y. baccata is Y. Mohavensis. In the Texan-Arizona region Y. baccata has yet to be separated from arboescent forms referred to it hitherto.

It might be presumed that this rather extensive critique of Jepson's botany, and the multitude of trivial errors found in it would lead one to the opinion that the book is a failure. This sugestion I want to emphatically deny. Jepson's manual is the best thing ever gotten out on California botany except the monumental flora of California by Watson. The botany will be a hand-book for years to come, and deserves it. There are parts of the book that show too much haste, and other parts that follow certain botanists too closely but in the main the work is good.

Jepson's Manual. On page 432 Jepson states that Arabis platysperma grows in the San Gabriel and San Jacinto mountains. I seriously doubt this statement. So far as I can discover all the material in those regions is low altitude stuff that belongs with A. dispar.

It should be noted that the young pods of both Arabis pulchra and

glauco-valvula are white-pubescent and round, and become flat in age.

Jepson errs again on page 431 twice. He gives Arabis perennans as perannans; there is no such word. Then he fails to say that Pringle is the author and not Watson for the word. Jepson also misspells it on page 428. On page 430 Jepson puts two i-s on Arabis Lemmoni Watson where there is but one. If Jepson were to adopt the habit of putting two i-s on every personal name there might be some consistency in it, but he still spells Bolanderi, Fendleri, etc., in the old way. The old rule for the use of this letter was simpy one of euphony, but even this was not always followed by the best authors. There was no real reason for using two in many cases like Drummondii, Lyallii, Cusickii, Howellii, Parishii, etc., but I see no reason for doing else than to spell them as they were spelled in the first place. Numberless cases of errors of this kind occur in the book.

I like Jepson's way of using the grave accent for the long sound of vowels and the acute one for the short sound. This is an improvement on the Synoptical Flora of Robinson. Robinson errs on page 166 of the syn Fl. where he puts the accent of Lemmoni on the penult instead of the antepenult. It would be much better if the circumflex accent were used by Robinson for the long sound than to simply use the accent to show on what syllable the stress was put in pronouncing.

On page 423 Jepson capitalizes Brassica alba where he should not. He decapitalizes all personal names, following the foolish custom of the zoologist. In the main Jepson's idea of genera is sound. He seldom if ever goes off into the Brittonian vagaries.

On page 445 he misses the chief character of Draba corrugata which is the exserted stamens.

On page 446 he recognizes Greene's genus Athysanus, following Robinson in this, and then puts Draba unilateralis in it. But my species is truly a Draba. I incline to the opinion that Thysanocarpus pusillus is better put in Draba than anywhere else. This leaves Thysanocarpus free and does not hurt Draba any, for there are other Drabas that have pendent pods, such as nemoralis, etc. Robinson does not at all clarify the situation by recognizing Athysanus.

On page 178 of the Syn. Fl. I again take issue with Robinson, who puts the accent of Stanleya on the e instead of the first a. The y there is not a vowel but a consonant, if counted at all. Robinson also follows the old custom of pronouncing Stellaria Jamesii by accenting the e instead of the a. The e is a silent letter in the original and the name of the explorer always was pronounced Jams, the a being long. Therefore on the addition of th two i-s the accent should still be on the a. This is the same with the nameJonesii. Jones never was pronounced Jonees.

In his treatment of the Crassulaceae Jepson follows what to me is the foolish practise of Rose, but he strangely does not still follow him in

Cotyledon.

Jepson in the Cactaceae has the aid of Parish, the most experienced man in the Southern California flora, and his treatment of the family leaves little to be desired. I notice the omission of Mamillaria phellosperma from the desert flora, M. Grahami seeming to replace it, but this I very much doubt.

On pages 408 and 409 Jepson makes the new combination Cleomella obtusifolia var. pubescens, ignoring the fact that Nelson 20 years ago made the same combination in Biol. Soc. Wash. 18 172 1905. Jepson also states that his name is the same as C. pubescens Nutt. but so far I can find Nuttall never published a C. pubescens.

On page 450 Jepson creates the genus Congdonia whose type species is C. pinetora, which should be pinetorum. Jepson does not seem to know that pinetum is the latin name for wood, pine woods, and that the genitive pinetorum means "of pine woods," there being no such adjective as pinetora.

On the same page he gives Sedella pumilum instead of pumila.

Britton & Rose in Crassulacae page 67 state that Sedum Douglasii was published in Fl. Bor. Am. by Hooker in 1832. My information is that pp. 145 to the end came out in 1834.

Chaetocalyx Wheeleri Gray. For some unexplained reason Jepson frequently omits species from the California flora, and this is one. On general grounds it should have been in his manual because it was gathered near Klamath Lake. I also got it at Benton station, California, above Bishop, along the roadside.

By way of explanation of the fragmentary character of the comments on Jepson's Flora I will say that they were made at various times in the last five years as I came upon the defects in studying certain families, and there is some duplication thereby.

RYDBERG'S FLORA OF THE ROCKY MOUNTAINS

We are glad that at last Rydberg has put his conception of species and genera in book form. His sporadic publications hitherto have shown botanists that he has no conception either of species or genera. In addition he accommodates us by saying that any plant deserving of a name should have a specific name. What he really means is that if any fool botanist anywhere in the world has applied a name to a plant as variety form or subspecies that name should be raised at once to specific rank, and which he proceeds to do. He cares nothing about historic botany in which the masters in the past built up a system that was reasonably satisfactory to all. At the same time he quibbles over priority by position as though it was a matter of any importance. He "strains at a gnat and swallows a camel."

This book is what I have in the past dubbed bughole botany, species depending on the number of bug holes in the leaves. Rydberg has no conception that there is any such science as ecology, or that environment has any effect on species variation.

I have accidentally talked with several teachers of botany in various places, and find that uniformly they condemn Rydberg's Flora as unworkable. They find the same conditions predicted by me some years ago to prevail, that there is no end to this stupid way of doing things, and it gets one nowhere.

In the matter of names Rydberg is very sloppy, not hesitating to change names that never have been printed as he gives them. Such as Fremontii. Watsonii, nearly always putting two i-s where there never was but one, and yet all the time quibbling over trifles. Then his Latin at times is atrocious. For example, he makes my specimens of Draba glacialis from Alta, Utah, the type of his Draba uncinalis, evidently not knowing that there is any such Latin term. He must have intended to have the name apply to the dwarf habit of the plant, which is about an inch high, but uncinalis is not the term for that, uncinalis means belonging to a hook, if such a term ever was coined, which is doubtful. But uncialis is the proper term for inch-like. Then in quoting names his botanical inspiration slips a cog very often, in such cases as Draba ventosa Gray (Rydberg Fl. Ry. Mts. 351 and 354), where he calls it D. ventrosa. Draba ventosa means the Draba of the winds, ventus, ventosus, not ventrosus, of the belly, or anus. When people get their botanical inspirations from other sources than hard work, as the Brittonians always do, they should see that the Almighty who tends to the inspirational

business does not loaf on the job, or be so hopelessly lacking in ecological knowledge as he is. When we look at this last botanical abortion of Rydberg and compare it with his flora of Colorado, which covers the same field, we shudder at what the next edition will be like. But where one gets his species from his imagination instead of nature there is no other result possible.

An illustration of the lengths to which he goes in species manufacture is shown by his 50 species of Draba, where there may be 20 at the farthest. He also makes 50 species of Arabis, when it is doubtful if there are over 20 valid species. In his treatment of Parrya he shows no originality, nor any proper conception of the real characters of the genus. He still servilely follows Greene in keeping up Arabis graminea Greene, which is not an Arabis at all but a Braya, Braya granininea. Jepson shows much more care and study in his recent Flora of California, where he puts Gray's Draba eurycarpa in Parrya, where it would seem to belong. No field botanist can ever agree with either Greene or Rydberg in their treatment of species if he has any knowledge. For their treatment is simply whimsical. Rydberg does not yet seem to have discovered that there is a study called ecology. I am told that Rydberg's Flora of Colorado was a case of botanical pirating, he having published, under his own name, the MS. of another who had died or otherwise having been incapacitated. I hope this is not true, but there is a vast difference between the two publications accredited to Rydberg sufficient to account for dual authorship. Rydberg has several times been roasted for unethical acts in the past, and his neglect of acknowledgment of obligation to others, particularly older botanists, is conspicuous.

Taking up Thlaspi Rydberg shows his usual lack of morphological information in making his keys, which he founds in part on the shape of the pods at tip. The real shape of pods is determinable only in fully ripe fruit, and much fruit is not fully ripe, therefore the seeming acuteness of the pod is just a matter of immaturity. For example, he credits T. Californicum to Utah and Montana when there is no evidence that it is found outside of the Sierra region if there. Then he founds glaucum and purpurascens on the color of the sepals which amounts to nothing. Nuttallii and Coloradense are on as trivial grounds. Parviflorum is founded on the small petals, a common character in all Cruciferae, which is particularly evident in allied genera. I fail to see any character that will hold in any of the proposed species.

In revising Lepidium we find accentuating trivial forms which do not hold in the field. For example there is no character given by anyone that clearly distinguishes L. Virginicum, medium and Texanum, and ruderale. Robinson tries to keep up a distinction on the accumbent and incumbent cotyledons, petaled forms and incisions of leaves, but in practise we find a-petalous forms with accumbent octyledons, and with cotyledons oblique, and other forms having the general Virginicum character

and incumbent cotyledon Rydberg of course proposes new names for each of these forms so far as he has seen them, which is not far. Robinson particularly mentions the "flat" seeds of Virginicum, but there are just as flat seeds with incumbent cotyledons and apetalous flowers. The dissection of the leaves amounts to nothing. Southern forms almost always have more dissected leaves. An example of this is in the proposed L. Thurberi Wooton, which is a strict form of montanum with congested inflorescence, another common southern form, but the style at once gives Thurberi away as a derivative of montanum. Another case of abnormality is in L. Eastwoodae Wooton, which is a tall and straight alyssoides tending toward the annual forms (apetalum). To admit all the proposed species of recent authors is an admission that there are no characters worth while in the genus. On the other hand there are certain groups that are well marked. L. integrifolium nanum and Fremonti are clearly definable species, scopulorum and montanum are less so. Among the winter annuals, which include all the rest, there is hopeless crossing except in dictyotum. The apetalous form seems the most permanent. Lasiocarpum seems to hold fairly well in the hot region, but there is more or less hybridizing with apetalum.

Another instance of Rydberg's lack of precision is in his making the name L. Jonesii (Torr. Bull. 29 233) where he states that it is the same as my Lepidium montanum var. alyssoides (Zoe 4 266), "Not Gray." In the place where I created the new name var alyssoides I state that it is based on Gray's "Lepidium alyssoides Pl. Fend 10." I do not cite any type locality for my name. Then of course as I intended L. alyssoides Gray is a synonym of my var alyssoides. But Rydberg goes on to state that my type, which he assumes was collected at St. George, Utah (where it was not), is the basis of his L. Jonesii. His citation in the first place puts L. Jonesii as a synonym of L. alyssoides Gray as the first line of his name shows where he quotes my var. alyssooides as a synonym of his Jonesii. Though later on he quotes my specimen of L. alyssoides from St. George as the type of his Jonesii he cannot make two different things the type of anything, and so his Joensii passes into synonymy and he must perforce make a new name for the St. George specimen. Now all this fuss over the thing is made without his ever at the time having been on the field or knowing anything about the variations of L. montanum, and yet throughout his botanical inspiration he knows that my St. George specimen is a new species. Too bad the rest of us have to depend on reason for our work, when it would be so much easier to chip off a slice of botanical inspiration from his botanical god and get the truth without so much labor. There is nothing more certain than that Rydberg is always a blunderer, both in identification and bibliography, and cannot be trusted. Then his handling of genera and species is diffuse to the utmost limit. In his work on Lepidium he follows Robinson's work, which is not satisfactory, as far as it goes, then he takes up Thellung's hair-splitting and

goes him one better. It so happens that most of the species treated by Rydberg are familiar to me in the field. To found species on the extent of pubescence, and the length of petals, shows a great lack of knowledge of the plants as they grow where the hairs vary from long and slim to short and stubby, which leads Robinson to use the term granular, an inappropriate one, for the short and stubby hairs. But Rydberg carries it farther. An examination of the species of Lepidium reveals great variance in the shape of pods of the same species. Then it is unfortunate that some other character was not used in describing pods as winged and in grouping them according to the extent of wings, which often separates related things. The result is that the species of Lepidium are still in a hopeless state of confusion. tI does not do for us to dismiss the question as Robinson does when he does not accept L. alyssoides as a var. of montanum by saying that though the species may intergrade at certain localities they are still distinct. Extreme forms can be separated but in the field it cannot be done. Alyssoides, in the form called Jonesii by Rydberg is shrubby as in L. Fremontii in the St. George region, but this character varies to simple biennial. The persistence of woody forms counts for nothing in the hot regions, where even tomatoes live from year to year and become bushes. All these things serve to emphasize the more the patent fact that closet botanists are not equipped to monograph genera. In my judgment these matters never will be settled till they are taken up by plant breeders. I consider Robinson's work in the Syn. Fl. as the best yet done by closet botanists, but there is still room *for* improvement.

It is impossible to follow Thellung in his treatment of Lepidium. He does not know the species he treats. He makes a new species of my L. pinnatifidum from San Diego and calls it L. Robbinsonii.

L. Virginicum varies from forms with large to minute petals or absent. The leaves seem mostly to be spinulose-toothed, all other characters fail. The pedicels are mostly long, 2-3 times the pods. I cannot make anything out of L. ramosum and ramossisimum Nelson. L. Vaseyanun and Crandallí seem to be scopulorum. L. crenatum is montanum. L. divergens is a form of apetalum.

Rydberg p. 19 Cont. N. Y. Bot. Gard 287 does not spell San Bernardino correctly nor Astragalus Bernardinus.

In commenting on my subdivisions of Astragalii Rydberg brings out what he considers inconsistencies, and they undoubtedly exist, but no one can treat any genus without being more or less inconsistent at times, for plants persist in growing in their own way. It is true that A. succumbens is not very near to the Malaci, and was long ago put by Gray and Watson in a separate group which they called the Succumbentes, but this arrangement does not solve any relationships. I for a long time kept up, even almost to the last, this grouping but in the end became convinced that genatic considerations made my last arrangement better, and I still

adhere to this view. But when Rydberg tries to split up the Hamosi he makes a mess of it. He makes the wholly unwarranted assumption that I assumed Astragalus hamosus as the type of my group, which is not true. If he were consistent he would make a new genus of Astragalus calycosus, which to all intents and purposes is an Oxytropis. I have published a complete description of this very peculiar species.

It is rather amusing to find Rydberg putting A. ensiformis which I collected, and which no one else has ever seen, in his Tricarinatae. The question now is what will he do with A. cibarius, its nearest ally? These fleshy-podded species have no place there.

As was to be expected Rydberg still mare attenuates the A. Nuttallianus group, making fake species out of many forms, which are not worthy of extended consideration. But I am glad that he has at last got a chance to correct his own blunders and make more.

In No. 280 Rydberg has a chance to elucidate A. Mexicanus, but he adds nothing to show that this supposed species is a good one, and there is little evidence that it is any good.

In No. 280 Rydberg is very sure that I am wrong most of the time, which is refreshing, and that he who has spent little time on the genus is always right, which is also refreshing.

In No. 272 Rydberg reverts to Astragalus vespertinus, which is the form of A. amphixys most common in the Navajo Basin. I have collected this in all sorts of forms, and have many times been confused as to just where to put it, and a m still of the opinion that it may intergrade with some of the species with net-veined pods (pygmaeus). I have the advantage of him in having collected the specimens (all of them) on which he comments, and for that reason should know more about them than he can.

It is true that I made a number of blunders in identifying the species of this group, for the reason that at the time I did not suppose that Watson and Gray knew so little about them as I afterward found out. It was years before I was forced to abandon following Watson and Gray in their ideas of the genetic relationship of Astragali, and of the identity of several species, and nothing but extensive field work ever solved the problems for me, work which Rydberg never did and never will do.

No. 253 Rydberg tries to perpetuate the blunders of Pyper and others in the Gibbsi group. He also misspells Astragalus Alvordensis.

In the same number Rydberg tries to keep up the Kentrophyta segregates, which are impossible. Curiously he omits mention of A. humillimus altogether, which he would have to put here if he knew it.

Astragalus Robbinsii. Rydberg, Torreya Vol 24 p. 98 plus, does more hair splitting in regard to Astragalus Robbinsii. There is no one fact more patent than that species of plants in the far north often intergrade hopelessly, and this seems to be the case in this species. In the Gray Herbarium is a specimen of Michaux's A. secundus, which is the type of A. Labradoricus DC., in flower and with immature pods, and which is

with little doubt the same as A. Blakei, and of which A. Robbinsii is a variety. I find the same tendency to variation in the allied species A. andinus, elegans and aboriginum. Fernald is also another hair-splitter, whose distinctions become hopelessly attenuated. I have seen about all the material extant on this group and so far my conclusions are in my monograph page 133. I can find nothing to hang a valid species upon. Astragalus Nuttallianus DC. Rydberg has at last got his scissors on this hapless species, and the result is hopeless dismemberment. If he would take some kindergarten course in ecology, he at least would have a chance to learn that there is such a study, and that ecological conditions cause variations in the same species according to its susceptibility to change.

In the matter of specific distinctions I can see little difference between Rydberg and Fernald. Both are splitters from Splitville, though Rydberg glories in wallowing in the mire. While Fernald does not seem to know that he is in it.

FERNALD

Alnus Pringlei Fernald. Robinson in Proc. Am. Acad. 44 No. 21 page 612 gives a locality for this plant as collected by me at Terreria, Jalisco. I never collected any plant at Terreria, if there be such a place. The plant in question was collected at Ferreria in the Tapalpa mountains, east of the volcano of Colima.

Troximon Nutt. Fernald in Proc. Am. Acad. 72 p. 126 attempts to refute Hall in upholding Troximon instead of Agoseris Raf. I do not think that Fernald is very consistent in his stand in the matter, for it is perfectly certain that Troximon as a genus was properly published in Nuttall's Genera. It is true that the word Gaertn. was given as the author of the genus by Nuttall, but the mere name Gaertn. is the only evidence that he was the author of the name. That Troximon Nutt. not Gaertner has valid standing is evident, and should not be replaced by Agoseris as Hall contends. As to the prority of Krigia over Cynthia I am not discussing, and I do not know how it can be decided. But Troximon Nutt. must be based on T. glaucum, which was not included in Gaertner's genus.

Fernald. Cont. Gray Herbarium 76 p. 215. In closing his description of Astragalus, Fernald makes the following remark: "A. stragalus is closely related to A. Yukonis Jones,—a species of similar habit from the Yukon. Jones's description is very contradictory, he stating in the key that A. Yukonis has leaves sessile, very many. Leaflets 6-8 pairs, but in the detailed description, leaves all rather long-petioled." Leaflets 3-5 pairs." I am obliged for calling attention to the slip in the key, one of those exasperating blunders that we all make in spite of all our precautions. But why "very contradictory?" It is a common comment of

workers in the Gray Herbarium that Fernald is becoming a common scold. He needs to be taken out in the woodshed and given a spanking. It is to be hoped that this will be done before he gets to the Bronxian position of seeing nothing good in the works of outsiders. If he had ever given a tenth of the time to any genus that I gave to Astragalus he would have done much better work than he ever has done hitherto, and it is not becoming to make such stupid remarks, and does not enhance his reputation for fairness.

Harvard is not addicted to blundering, but Fernald seems an exception to the rule. In naming his proposed new species of Astragalus stragalus he makes two "very" serious blunders. The name stragalus should not be used because it does not correspond phonetically with the genus name, and because there is no such adjective as stragalus in Latin, a fact that Fernald ought to know. He might have used stragalarius, or stragalensis, but has little authority for using a noun as an adjective, and none in a way that means nothing. Fernald recently seems afflicted with that disease known as "caput intumescens," doubtless caused by too much gazing on the sun of his own personality till he has a case of snow-blindness. I fail to see where he has any justification for it for his work on Salvia and Antennaria he should be ashamed of, and his incapacity to discern specific limitations is notorious. Of late years he has shown one commendable virtue, refrained from monographing genera that he knows nothing about in the field. Astragalus stragalus looks to me like a cheap sophomoric attempt at alliteration. As to the validity of his species I make no comment except to say that it appears too near my species. For the leaves of my species vary so that the leaves are either sessile or long-petioled.

THE BRANDEGEES

Townshend Stith Brandegee. Class of 1870 Yale Scientific course, born in Berlin, Conn., Feb. 16, 1843. Son of Elishama Bandegee and Florence Stith Brandegee, who had 8 children, Charles, Florence S., Robert B., Emily, Katherine, Henry (died at Helena, Mont.), Arthur, Edward N. (Yale 1886). Elishama, who was born at Berlin, Conn., died there in 1884, and was a Doctor who graduated from Yale in 1833, and Yale Medical school in 1838. Florence Stith was born at Florence, Italy, whose father was consul at Tunis. She was a Bolling from Petersburg, Va.

T. S. Brandegee was a private in Co. G., 1st Conn. regiment, in the Rebellion. He entered Sheffield in Civil Eng. On May 29, 1889, he married Katherine Layne Curran, a graduate of the Medical Dept. of the California State University in 1878. She was a daughter of Marshall Bolling Layne. Brandegee was a civil engineer of the A. T. & S. F. R. R. with headquarters at Canon City, Colo. Also with the Denver & South-

Park R. R. He was assistant topographer and botanist for a year with the Hayden Survey. Was forest topographer in the survey of the Adirondacks, New York. Was forest topographer for the Northern Trancontinental Survey in Yakima Region, Wash. Was on the forest map of the Tetons Reservation, U. S. Geol. Surv. Was Surveyor of Canon county, Colo. Was city engineer of Canon City. Was a member of the Board of Education of San Diego, Cal. Was Hon. Curator of the herb. of the University of California. Was a member of the California Academy of Sciences, and San Diego Academy of Sciences. Was a corresponding member of the Phil. Acad. Sci. and New York Lyceum of Natural History. Was owner and editor of Zoe. Presented his herbarium to the University of California.

The two Brandegees, after living to a ripe old age, have also gone. Mrs. Brandegee, who was considerably the younger, died first in 1920. She was incontestibly the greatest woman botanist that ever lived. More of her later. Her husband, Thomas Stith Brandegee, first came to my notice in 1877 when I was studying Porter and Coulter's Botany of Colorado, where all through the book were constant references to his collections in Wet Mountain Valley, the Sangre de Christo range, Canon City, etc. He was a civil engineer in the employ of the Rio Grande R. R., with headquarters at Canon City. The next year I began my botanical work in the west at Colorado Springs, but I never met Brandegee for many years thereafter. He graduated from Yale in 1867 and was a classmate of my old friend, C. P. Brooks of Salt Lake City, who was the leading civil engineer of Salt Lake for many years.

Brandegee was a little, quiet, refined man, a great friend of the ladies, and a hard student, an old bachelor. In the early eighties he was attached to the transcontinental survey, following the line of the Great Northern R. R., and collected considerably in Washington. Then he seems to have made San Francisco his headquarters, where his botanical work brought him in touch with the California Academy of Science and the Californian botanists of note at that time, namely, Lemmon, Greene, Behr, Mrs. Curran and others. Mrs. Curran was formerly Kate Layne of Carson City, Nevada. The two seemed to naturally fit into each other's lives in a remarkable way and soon married. She was the most virile woman I ever knew and he was the most feminine man I ever knew. Her mentality was that of a man through and through, and she was intensely active and efficient. While all his tastes seemed more feminine. He was a college man and an engineer at a time when such men were at a premium in the building of the great highways across the country.

Brandegee began his work in Colorado just at the time of the close of Government exploration. In fact he was attached to two such parties, one in the San Juan of Colorado, and the other in Washington, north of the old route of Lewis and Clark. From his writings I learn that he was first with the Santa Fe R. R. Then with the Rio Grande R. R. He must have been employed during the railroad war between the two

roads, which in 1879 culminated in fortifying the Grand Canon of the Arkansas by armed parties from each road, in an effort to secure the only right of way through the canon. The Rio Grande R. R. had leased their road from Pueblo to Denver to the Santa Fe for a period of 99 years. In 1879 the Santa Fe began to convert to their own use all the rolling stock of the Rio Grande, and to paint out all indications of the original ownership. This led to a coup by my friend General Palmer, President of the Rio Grande, in the spring of 1879, by which in one night he stole back the entire road and equipment. The court litigation following this resulted in the Rio Grande getting back its road and the right to build the road through the Grand canon of the Arkansas and on up to Leadville, which at that time was the greatest mining camp in the world. The retirement of the Santa Fe from transcontinental rivalry with the Rio Grande and their building southward to Las Vegas and westward through northern Arizona, doubtless was the cause of Brandegee quitting Colorado.

My acquaintance with Brandegee's work began in 1877, when I began studying the flora of Colorado preparatory to exploring it in 1878. He always impressed me as being the best of field collectors, not old-maidish like Pringle, who never would collect a specimen unless it was in perfect condition. Wherever I have followed Brandegee I have found the new species picking very poor. He combed the country well wherever he collected. His memory was excellent and his ecological notes accurate. Pringle made the best of specimens ever made in the West, but he was too particular to be a good field collector. Brandegee was a very quiet man, and very hard to get acquainted with. A man of few words, who spoke right to the point always, and one who always avoided strife. After his marriage to Mrs. Kate Curran she became the spokesman of the family. Though she never dominated him. My more intimate connection with the two began soon after the launching of Zoe, when they solicited articles from me for publication. This botanical intimacy continued to the end. Mrs. Brandegee never attempted to dominate me in anything, was always considerate and appreciative, and when it became evident that they would have to discontinue Zoe she asked me to take it up and continue it, but I refused for lack of time.

Mrs. Brandegee spent several days with me in Salt Lake twice, going through my herbarium and consulting with me about Gilia, Eritrichium, and other genera in which she had done particular work. I remember with great pleasure the fine days we spent together. During her stay Mrs. Brooks, the wife of C. P. Brooks, who was a college classmate of Brandegee's, got up a reception for Mrs. Brandegee and invited the local celebrities to meet Mrs. Brandegee. I shall not soon forget the disgust she showed at being lionized, and her great relief when we were on our way home.

Mrs. Brandegee was a big and robust woman, a man in almost every respect, who was rather careless about her dress. Never put on any feminine finery, wore her hair tied loosely about her head, but was

always clean. She was all business and spent no time on formalities. She impressed me as every inch a queen. A person with a wonderful personality, and not at all social. She discussed contemporary botanists with perfect frankness, giving a just estimate of each, and she had a marvelous keenness of botanical discrimination, and a perfect memory. I never had the slightest fear that she would ever show anything but judicial judgment on any botanical proposition, or she would ever be anything but perfectly fair. Many times I urged her to write out in full an account of her botanical work before it was too late. Her reply was, "What does the world care for me?" Her death left her work in a chaotic condition. She of all others was the best equipped to write a real flora of California, and it was a calamity that she did not do it. The brochure of Setchell on the Brandegees gives in an impersonal way a review of their work, but I have felt that it needed the addition of a personal account which I have done so far as my acquaintance with them warranted.

Some eastern botanists got an idea that Mrs. Brandegee was a virago because of the way she handled Greene, but this was an erroneous idea. Greene was a man who never had any personal friends, his overweaning opinion of himself, which he was always injecting into his conversation, repelled people. He was a moral reprobate, a retired Episcopalian minister, kicked out of the pulpit because of sexual vices, and a conscienceless liar. The way Mrs. Brandegee handled Greene was perfect, and entirely free from any feminine bias. She knew him more intimately than others because she was a student under him at the beginning, and a coworker.

CRYPTANTHA BY PAYSON

This posthumous work by this talented young man appears to be the best ever done by him. Though I do not agree with him at all in his conception of species, believing him too much of a hair-splitter, I recognize his very conscientious work and the infinite pains he has used in getting results. When it comes to splitting genera we have two concepts—the Grayan and the Brittonian. The latter has always been discredited by its origin, which was institutional jealousy. However we find many botanists who wholly or in part have gone over to the European idea, which for descriptive purposes I prefer to call the Brittonian. Fernald does not differ in effect from Britton; he is just as much of a hair-splitter. Robinson in his treatment of Mexican plants does not seem to vary much either. To a collector in the field they are all tarred with the same stick. Rose has been for years in the Brittonian camp. The prevailing way at present is to make genera of any groups however small if those show no intregradation, but in effect this is not observed. To me the Grayan concept is far more scientific and desirable at least from the standpoint of ecology and genetics. I admit that there can be divergence

in perfectly honest investigators, and that every one has the right to respectful treatment so long as he does not assume as Rydberg always has, a sublime superiority due to "superior and most painstaking study," which to me is pure botanical bunk. Greene the boss bluffer is dead, Rafinesque also is dead, and the rest of the bluffers are rapidly sinking to their proper level.

We have certain generic concepts such as Aplopappus, Aster, Eritrichium, Astragalus, Carex, etc. Those less cemented such as Aplopappus, Eritrichium and Astragalus have been split ad infinitum, and what good has it done? I kept up Krynitzkia for the simple and only reason that Gray adopted it in place of Eritrichium on grounds of priority. Cryptantha I did not adopt for the reason that it was adopted by Greene, and I do not yet know which name should stand of all that have been proposed for the Grayan concept of Eritrichium, and further I do not intend to go into it till I get to it in regular course. I have long since lost my faith in the reliability at last resort of even Gray, to say nothing of the smaller fry. The older I get the less I think of genera founded on histology. There is no relief in sight till we can grow all plants.

I do not at this time intend to go into Payson's work on this genus. I spent a year on his Cruciferous segregates before I cared to state my opinion, and this genus I will study in due time, but my field knowledge, gained in 50 years of actual field work, leads me to discount at least half of his species. I do not see how any such list of species could have developed under the ecological conditions prevailing in the West since Tertiary times. I am inclined to think that a few species are in a state of flux, as is Astragalus lentiginosus, such as Eritrichium glomeratum and leucophaeum, and that they had far better be kept in a big specific group concept than to be split up.

Johnston. Proc. Am. Acad. 68 p. 46. In renaming Echinospermum subdecumbens Parry as Hackelia floribunda Johnston says: "The use of Parry's name in the Rocky Mountain Manual is incorrect. The plant is definitely blue-flowered, as the lack of mention of the color in Parry's observations would suggest." Now the type of Echinospermum subdecumbens was got by Parry on the slopes of the north bench south of Ensign peak, Salt Lake City, and every year I was over that very bench and for this reason I say without any hesitation that Johnston is wrong. The flowers range from sky-blue to pure white and every variation can be had at any time when the plant is in bloom. I have always thought it a well-marked variety of E. floribundum which is biennial and grows in the adjoining canon.

In his various studies of the Eritrichium group of borages Johnston seems to be gravitating back to the primary position of Gray, and also sliding back into the Brittonian camp of splitters. I hope that a field botanist can take his results and identify anything he finds thereby but I am much inclined to think that he will land at Patton, California as a ward. (Patton is where they keep all the nutty folks.)

TIDESTROM'S FLORA OF UTAH AND NEVADA

Tidestrom's Flora of Utah and Nevada. Some years ago this young man came out to Utah connected with the seed department of the Government, and was employed at the forest nursery in Big Cottonwood canon. When that was abandoned he left the state. He did a little botanizing in the Wasatch then. Later on he was in the La Sal region of the Navajo Basin, where he tried to make several species out of the grotto forms of Aquilegia. Recently he has worked a little in Western Nevada. This seems to be his equipment for writing a Flora of the great states of Utah and Nevada. During the several years he spent in Utah he never made any attempt to acquaint himself with my herbarium, nor did he ever call on me but once and that was when I was away in Montana. No one could ever write a Flora of Utah and Nevada without knowing the types in my herbarium. It seems to be a fad of the Government to send inexperienced young men out to write floras of western states, instead of employing men who know the flora already. Recently this was done by Standley, who was employed to write a Flora of Glacier National Park, when The University of Montana already had one in MS. form ready for the press.

One of the most noticeable things about this Flora is the looseness of locality citations. Everywhere we find references like this: "Covillea," Larrea, belt, "Artemisia" belt, which sometimes mean something and often do not. P. 80 he speaks of the aspen and spruce belts as though they were separate things, when they stand for the same thing. On page 73, in quoting Oryzopsis micrantaha, he says: "Plains and foothills, and canyons of the Covillea belt, Nebraska to Saskatchewan," etc. Rather unique that that belt should reach Nebraska and the Saskatchewan. In speaking of O. hymenoides range he says "Desert areas, plains, canyons and mountain sides of the Covillea belt, Manitoba to Texas," etc., which is not true, as there is no Covillea belt in Manitoba. He does not seem to know what the Artemisia belt is. It covers all of the Pinyon and decidious oak zones. Then in quoting the range of Oryzopsis Webberi he makes it Colorado to California when in fact it is confined to western Nevada and California and is a doubtful species at best. His work shows little discrimination as to the value of species, quoting almost everything that has ever been accredited to the region, whether it actually exists or not. A great deal of bunk is found in various publications which should be discriminated from the real thing. His synonymy unhesitatingly quotes species of mine, types of which he never saw and never made any attempt to see, as synonyms of other species.

Taking the Astragali, which I recently monographed, let us examine his ecology. A. amplarius he gives as growing in "wet places, artemisia that it grows anywhere but on alkaline slopes where it is dry, and in the

belt." This plant he never saw nor has anyone else since it was collected by Mrs. Thompson near Kanab. There is no reason for thinking that it grows anywhere but on alkaline slopes where it is dry, and in the juniper belt. A. Wetherilli is given as growing on "plains and hillsides, artemisia belt." It has never been seen but once and that along the banks of the Grand river, east of Grand Junction, in the juniper belt. A. allochrous is given as "plains and hillsides of the Covillea belt, upward to the yellow pine belt." Its actual locus so far as I know is never in the covillea belt, and never up to the yellow pine belt. Then his range is far too great. A. Eastwoodae he gives as "Valleyes of the artemisia belt." It grows on sandstone ledges along the Grand river west of Grand Junction, near Moab, in the juniper belt. A. lutosus he also never saw the type. He says it grows in barren scoil of the artemisia belt. It grows only on sandstone ledges in western Colorado and not Utah. A. Tejonesis he gives as growing in southern Nevada, when it is not known to exist there. A. cermicus (pictus) he gives as growing on the plains and rocky canons of the artemisia belt. Its real habitat is drifting sand or sandy places. A. triquetrus he gives as growing in canons, when it grows on plains only. A. artipes he gives as growing in the yellow pine and aspen belt. Its real habitat is never in the aspen belt but in the juniper belt up to the edge of the oak belt. It should be noted here that the artemisia belt goes from the edge of the covillea to the aspen, two life zones, and includes the juniper and pinon belts as well. The juniper and pinion belts belong to my Lower Temperate and Merram's Upper Sonoran. The upper part of the artemisia belt belongs to Merriam's Transition, and to this belongs the yellow pine belt. A. Whitneyi he gives as from Nevada, but there is no evidence that it ever was found in Nevada. A. Wardi he gives as growing in the aspen and spruce belt, where it does not exist, as it grows in the oak and upper part of the juniper belt. A. Hornii he gives as growing in southern Utah, when it does not grow outside of California and Mexico. A. sesquiflorus he gives as canons and dry hillsides of the artemisia belt. It grows only on loose sandy ledges near Kanab, Utah, in the juniper belt. A. Thompsonae he gives as growing only in Utah on plains and hillsides, when it actually grows in Nevada, and Arizona, in sandy places in the Covillea and juniper belt, as well as southern Utah. A. Carolinianus he gives as doubtfully in Utah. It does not grow there at all. The only form known is the one he calls A. Mortoni. A. ursinus he gives as growing in valleys of the artemisia belt in Utah, when it actually grows only in Arizona, bordering the Grand Canon, in the Covillea belt. A. calycosus he gives as growing up to the spruce belt, Idaho and Utah to California, when it is common throughout western Colorado, New Mexico and northern Arizona. A. scaposus (a form of calycosus) he gives as growing in Wyoming to New Mexico, Arizona and Utah, when it does not grow in Wyoming, but occurs in south central Utah to northern Arizona and Nevada. A. atratus he gives as a synonym for A. pinonis Jones, which

it is not. A. stratrurensis he gives as plains and hillsides. It grows only in oak brush in canons. A. eremiticus he gives as a synonym of A. scaphoides Jones, when it is not. Scaphoides grows only in Idaho or eastern Oregon, and not Utah or Arizona. A. asclepiadoides he gives as growing on plains and foothills of the artemisia and pinion belts, when it grows only on alkaline areas in the juniper belt. A. sabulosus he gives as a synonym of A. procerus Gray, when it is not, and gives its range as the Covillea and artemisia belts of Utah and Arizona to California, when it grows only in Utah, near Moab. The A. procerus of Gray is a form of A. Pattersoni and grows so fas as now known only in the vicinity of St. George and Zion canon, Utah. A. Preussii he makes as a synonym of A. Mokiacensis, which is not. A. remulcus he gives as of the yellow pine belt in Arizona, when it belongs in the juniper belt. A. Zionis Jones he gives as of the artemisia and pinion belts of Utah, when it is found only on ledges of Zion canon. A. cymboides Jones he gives of the plains and hillsides of the artemisia and pinion belts, Utah. It grows only on plains in the juniper belt. A. peterocarpus he gives as alkaline plains and hillsides, when it is found only on the alkaline flat of the Humboldt river. A. Purshii var. tinctus he gives as a possible synonym for A. funereus, which it is not. A. debilis he gives as ranging to the Yukon, which it does not. He keeps up the fictitious A. Garrettii (of Rydberg), which is only a form of A. tenellus. He also blunders in making A. Kaibensis the same as A. lancerarius. This is partly my fault, as at the time of publication I mistook A. lancearius for another species, but later on I had a chance to study the plant growing abnudantly. He gives A. flexuosus as growing in Utah, when it does not. He fails to see the spurious character of Sheldon's A. curvicarpus, which is only a form of A. Gibbssii. He gives A. speirocarpus as of sagebrush plains and dry hillsides, when it grows on sand dunes only. He keeps up such fictitious species as A. tegetarius, which is only a form of A. montanus. He omits a number of species such as A. Oreganus, A. terminalis, Mohavensis acutirostris, etc. His whole work shows little real study of a critical kind, and very little knowledge of localities or life zones.

Taking the Cactaceae we find him adopting the recent work of Rose & Britton, which nobody adopts. The same loose citations of localities are found here as elsewhere. Echinocactus polyancistrus is given as of the artemisia and covillea belts, Nevada and California, which is utterly vague. The fact is that the species grows only in the covillea area of southwestern Nevada, south of Goldfield, and in the Death Valley region of California. He does not mention E. polycephalus at all, though it is common. He gives Echinocactus Johnsoni Parry as Johnsonii, but has not the slightest idea of where and how it grows. He says "desert areas, canons, and dry hillsides of the Covillea and artemisia belts, southern Utah and Arizona." Now desert areas is all right for the whole region of the west is desert, canons is all right, for the region in the mountains is mostly canons and ridges; dry hillsides is all right, for all the hillsides are dry. But what does it all mean to a botanist Nothing worth

while. Now where does this very rare plant really grow? The type locality is on the western slopes of the Beaverdam mountains, Arizona, in the Larrea (Covillea) belt, sloping mesas. It does not grow so far as we know in Utah. Near Moapa, Nevada, it grows on the slopes of gulches in the juniper belt at about 6,000 feet altitude in the mountains. At Searchlight, Nevada, it grows on the slopes of dry hills in the Larrea belt. It has never been seen anywhere else except a questionable specimen by Coville in the Death Valley region. Echinocactus Sileri he follows Rose in crediting it to Utah, and Rose knows nothing about it except the brief note of Engelmann in the original description, who credits it to Pipe Spring, Arizona (not Utah), and on Cottonwood creek, near there. There is no evidence that the plant grows in Utah. He credits it to the artemisia belt, when it is in the covillea belt. Echinocatus Simpsoni he also gives two i's, as usual. His localities for this are plains and hillsides in the artemisia belts. There is no evidence that it ever grows on plains. Its chief localities are rocky ridges of the oak zones and lower spruce zones, though at Colton, Utah, it grows just on the lower edge of the oak zone. He does not give Mammillaria deserti at all. He gives Opuntia pulchella as desert areas and hillsides of the artemisia belt. So far as I have seen it grows on flats in the atriplex areas of western Nevada only. He does not give O. rutila at all, nor mesacantha, nor arborescenes, and he gives no symphony. He does not give the mountain Mammillarias at all. His distribution knowledge is about nil except what he can get from others. This is a sample of the whole work, and the Government is paying for this kind of stuff. Why not send these young men out to dig potatoes? They could only hurt the potatoes.

In his account of Lepidium scopulorum Jones his localities are "Valleys and canyons, and mountainsides, which shows that he knows nothing about its habitat, for it grows only on cli...s, never in valleys. He shows the same ignorance in Lepidium integrifolium, where he says "valleys and foothills of the artemisia and Pinon belts," when in fact the plant grows only on alkaline flats along with Sarcobatus and the like.

Another illustration of Tidestrom's foolish way of citing localities is Iva Nevadensis Jones. He gives it as "Artemisia ,belt" Nevada. Now since all of Nevada except the southern part is artenisia belt, this has no significance except to exclude it from Utah. Now the facts are that up to the time of the publication of his flora nobody ever saw it but myself, the original collector and I found it in the park at Hawthorne and the type locality seems to have been obliterated. Now Hawthorne is on the very lower edge of the sagebrush adjoining the Tropical. Since then I have found it in two localities, in identical zonal localities, one at Benton Station in the upper edge of Owen's valley and the other west of Columbus Marsh, near the pass leading over from Tonopah to Bishop, and both in California. From Tiedstrom's locality no one would know whether the plant grew at Ely, Searchlight, or Reno. Tidestrom does not know enough about ecology to know that the artemisia belt goes through two life zones from the Larrea (Covillea) to the spruce (Canadian), and

includes the pinon, which he seems to think is distinct from the artemisia. In citing range of Iva axillaris he says "artemisia, pinyon and yellow pine belts. Now the artemisia covers all of them, the yellow pine belt being Merriam's Transition. But Iva axillaris goes down into the Tropical also.

Now take some Gilia localities. Gilia McVickerae is given from the artimisia and pinyon belts, Utah. The facts are that it has never been found outside of the type locality at Marysvale, Utah, on arid and clayey south slopes of volcanic cliffs, Lower Temperate life zone. Gilia scopulorum Jones is given as from rocky places of the Covillea belt of southern Utah and Nevada. Its real locality is St. George, Utah, growing at the base of lava flows in the shade. Gilia ochroleuca Jones is given as plains and hillsides of the Coviliea belt. The facts are that it grows in loose sand in the Tropical from the Colorado river westward. He gives Gilia Watsoni as rocky hillsides and dry canons, when it always grows on cliffs, and extends to California. He says of Gilia Nuttalli that it grows in canyons, rocky slopes and ridges of the artemisia belt. In fact the plant is always found in coniferous forests of the Middle and Upper Temperate in dry places, preferably ridges. Its southernmost limit being the Charleston mountains, Nevada.

In his treatment of Dicoria Blake, who does this family for Tidestrom, goes too far in emphasizing the development of the bladdery covering of the seeds, whose development is simply a factor of humidity at the time of fruiting. Blake's treatment of the Aplopappus group seems sane, though he recognizes altogether too many species.

Taking up Astragalus Tidestrom has made a complete mess of it and keeps up most of the forms described as species by anyone. Of these I will not speak now. On page 324 he puts the question mark before A. Peabodianus instead of after it. He makes A. eremicus Sheldon a synonym of Fremonti, which it is not. He makes A. latus Jones the same as araneosus Sheldon, but that species is a form of palans. He makes A. pinonis Jones a form of atratus, but it has no relation to that species. He makes A. eremiticus the same as my arrectus var. scaphoides, which it is not. He makes A. sabulosus the same as A. procerus Gray, but that is a variety of Pattersoni, while sabulosus is a good species of the Preussii group. keeps up my A. Uintensis, when it is the same as A. argophyllus. He makes my A. funereus the same as A. Purshii var, tinctus, a most egregious blunder, for it is closely related to A. coccineus. He makes A. episcopus the same as A. lancearius and Kaibensis, when in fact none of the species are synonymous. He makes A. Coltoni and its var. Moabensis the same, when they are quite different. He could have avoided all these blunders by reference to my monograph, which was available to him at the time.

GREENE

There have been several notable deaths in the botanical world since my last Contributions. Greene, the pest of systematic botany, has gone and relieved us from his botanical drivel. They say that the good that men do lives after them, but the evil is interred with their bones. I suspect that his grave must have been a big one to hold it all.

An illustration of the dishonesty of E. L. Greene is shown in his description of his new genus Disaccanthus on page 224 of Leaflets, published in 1906, where he publishes Disaccanthus validus, based on my Streptanthus platycarps, collected in 1884. He first stated that it "was collected somewhere in western Texas" by me, when the label on the only specimen he ever saw stated that it was got at El Paso. Then he knew when he published his new name that the specimen was in fruit with a few flowers, and so how did he know that it was not what I had called ? Greene was first, last and all the time a botanical crook, and an unmitigated liar, when it suited him to try to make a point against someone else. He describes the pods as 4 lines wide and obtuse, when they are 5mm. wide and very acute. The flowers are creamy-white, or purple, and with conspicuously oblanceolate petals. Then he describes the plants as stout, when they are slender. The root leaves are pinnately divided. The flowers are inflated below and not in the middle. The material on which he based his species was the only material that I ever distributed as Streptanthus playcarpus, and the name should be S. carinatus. He also makes another name D. Mogollonicus out of stuff of his own collecting, which seems to be the same, as is also his D. luteus. One can have patience with a fool but not with a crook. S. carinatus is described as having purple flowers. All my material from that region has purple or white flowers or cream-colored, the petals sometimes being purple, but there seems to be no other character, while we know the flowers of all the species vary from white to purple, but the angled and carinate calyx is characteristic.

I got my material which Greene saw and used as his type in April, 1884, at El Paso, Texas, as is distinctly stated on the label. The actual place of collection was just north of the city on the hills. My material fits Gray's description in the place where the type was described (Pl. Wright. 210) as to the color and shape of the flowers, and which Greene tries to distort by the implication that the flowers of the type were not purple, when they are so described. One thing Greene did not observe was that the young flowers are not at all keeled, but the mature ones are decidedly so. He evidently got his names mixed, as S. carinatus, which is also described in the same place, is given as having purple flowers. My old material of this species, which I gathered at Rincon, New Mexico, April 30, 1884, and which I had also called S. platycarpus, has the characteristic flowers keeled conspicuously, but yellow. My observation

of the flowers of this genus indicate that though they are normally purple they sometimes are green or white, which I often find in S. cordatus. White or cream color seems th more prevalent color of the hot deserts.

Another evidence of Greene's lack of precision is shown in his characterization of Arabis nardina (Leafl. 2 70), where he says: "The second species here presented, though the specimens are past flowering, is readily seen to be of that well marked broad-petaled group which A. pulchra of Jones is typical." Then lower down he says: "The label once bore the name, in Sereno Watson's handwriting, of Arabis platysperma, but the specific name was erased, evidently by Mr. Watson himself, and no other written in place of it. The plant is certainly far removed from the group of A. platysperma; and no one familiar with A. pulchra and with the diverse aspect of things made congeneric with it, could fail to see that, despite its erect pods, this is of that group." This flambuoyant buncomb was calculated to impress the ignorant with his superior knowledge and insight. Now what are the facts? I am the author of the name pulchra and have in my herbarium more specimens of it and its congeners than anyone else. It is closest related to A. arcuata, and only remotely related to the platysperma group. It is destitute of the conspicuous style and acuminate pod of that group, which is a conspicuous character in nardina and its mother species, A. Parishii, of which it is a well marked variety. It also has the peculiar character of wavy sutures which distinguishes platysperma from all others. That platysperma, petiolaris, Parishii, and suffrutescens are in a group by themselves is evident. To this also belongs A. Howellii. Greene then goes on to make a spurious connection between A. pulchra and the Breweri type, in the same hot air way. If this were the only break of this kind we might forget it, but it was Greene's constant device to reinforce a weak position, and he did not disdain to knock anyone who was in the way at the time, as in the case of Arabis gracilenta Greene, where he discredits Heller, who collected the type of gracilenta, and stated that it was A. Fendleri from the type locality. Greene does it in this way, Pitt. 4 194: Nevertheless nothing like the Fendlerian plant on which A. Fendleri should be based is in Mr. Heller's collection." Which is more buncomb.

Greene's assurance was limited only by his opportunities, and his assumed superiority in first hand knowledge was sublime to those of us who knew he did not know straight up about what he was writing about In fact it never had its equal except in some of the writings of Rafinesque and recent pronouncements of Rydberg on Astragalus.

Sibara Greene Pitt. 3 10. I incline to think that Greene is right in erecting this genus to include certain Cardamine species. I never could feel like putting them in Cardamine. C. Palmeri is far better a Thelypodium than a Cardamine, suggesting a relationship with the deflexum group of Sisymbrium.

Ranunculus Populago Greene Erythea 3 19 1895 is another case of sharp practise on the part of Greene. I had that sheet out and under study and named Ranunculus Cusickii in the winter of 1894-5. Greene comes along and finds out what I had done, and gets his name in print

before I did mine. This to him was a piece of cute work, like the Mexicans do when they cheat you out of a few cents when you make a bargain with them. He had once before got me to send him a lot of material of Compositae from my collections, on the plea that he was going to monograph the family. I went to the trouble to give him a complete suite of Compositae. After receiving them he replied that my stuff was so poor that it was fit only for firewood and so he refused to send me specimens in return for them except a few things from New Mexico. Later on, when he began to publish comments on the Compositae, he spoke of my specimens as a part of his set of my Colorado plants, when the fact was that he never bought a set of my plants in his life and never before or since got any from me. Greene was first, last and all the time a cur.

In Pittonia 3 127 to 138, Greene, with a great show of erudition, regroups the species of Erysimum into Schoenocrambe, Cheiranthus, and Erysimum, putting E. asperum and E. cheiranthoides in Cheiranthus, which is about the most stupid thing a real botanist would ever do There might be some reason for keeping up Cheiranthus for a certain group, but to put E. cheiranthoides into the same shows a total lack of discrimination. There is a certain resemblance between cheiranthoides and Sisymbrium species, like virgatum, but to keep the former in Cheiranthus spoils it all.

We have a similar problem in Sisymbrium. I don't see how S. canescsns and altissimum and deflexum can be kept together, but to run certain Thelypodia into the genus makes a mess of it.

Recently I have been going over Greene's Leaflets and notice his treatment of Rhus trilobata, which makes one feel like committing murder, but fortunately Greene has passed beyond human retaliation. His case makes one half inclined to believe in Hell, for no other place would be suitable for him.

Hesperodoria scopulorum (Jones) Greene Leaflets 173. Bigelovia Menziesii var. scopulorum Jones Cont. 7 692. Greene says of this, "where it is described by Mr. Jones, who however failed to apprehend its real affinities. It is next akin to my genus Pteradoria, i. e. Nuttall's Solidago pumila," etc., etc. It is wonderful how Greene, with but a single specimen to study, in contrast with the collector who saw it growing and got much of it as it grew, and who studied it on the field and was such a numbskull, while Greene, with his marvelous conceit, could see characters that never existed at all. Then again, what did Greene ever know about the real relationship of Solidago pumila as to whether it is a Bigleovia or a Gutierrezia? The only thing I regret is that I did not get after him years before I did, and show him up as he deserved. Had I seen all these remarks when they came out I certainly would have roasted him to the queen's taste. But I never examined much of his work till it came up in order after he had gone. And in addition I had so little confidence in his work that I did not think it worth considering.

Corrections of the Synoptical Flora edited by Gray, Watson and Robinson.

Page 107, line 4, insert "leaves" between "and" "obovate."

Page 107, second line following Draba Mogollonica, read "stellate-pubescent."

elsewhere.

Page 122, Lyrocarpa. For complete description of living plants see

Page 127, line preceding "L Menziesii," exchange "exceeding" for word there.

Page 127, insert just before the line "L. apetalum," etc., the line beginning with two equality signs and the word "apetalous" to correspond with "Petals present" above.

Page 148, substitute "N. curvisiliqum" for "curvisiliqua."

Page 148, third line below "N. obtusum," insert "pods" before "1 to 2 lines long."

Page 160, under "A Nuttallii," third line below, write "entire or obscurely denate."

Page 163, under A. alpina, the fifth line below, insert "pods" before "glabrous."

Page 163, under Turritis, one star has "Radical leaves dentate," on the next page and under this head A. Holboellii is described as having entire leaves.

Page 165, the first line should give credit to Pringle for the name, if we were to use the common but not Grayan method. This has led Jepson to err on page 431 of his Manual, as indicated elsewhere.

Page 167, fifth line below "A. pulchra," change "three fourths" to "three to four." This is a straight blunder of Robinson's.

Page 172, under Caulanthus glaucus, the petals should be given as dirty white.

Page 178, "Stanleya" should have the accent on the first "a."

Page 179, the doubtful specimen referred to is surely S. elata. This is on the first line of the page.

These suggestions are submitted not as criticisms but as corrections of this admirable work.

Watson Cont. Am. Bot. (6 p. 63) refers a flowering specimen of "M. E. Jones at San Quentin." Lower Calif. to Coldenia angelica. M. E. Jones had never been at San Quentin up to that time, nor any other for 30 years after.

CRASSULACEAE BRITTON AND ROSE

This attempt to monograph the genera of this family shows haste and lack of thoroughness. I find synonymy is incomplete. Sedum subalpinum Blankenship is not mentioned, as is also Sedum Elrodi Jones, both species being published some years before the revision was contemplated or written.

The same method, fathered by Britton, of splitting up genera on trivial grounds, that was so conspicuous in the Cactaceae, is used here, much to the detriment of systematic botany. The same method of making species of mere forms is also characteristic. The experience of Rydberg in his Flora of the Rocky Mountains ought to have been enough to deter them, but it was not. The condemnation of Rydberg's flora is almost universal. It cannot be used successfully in the class room.

BRITTON AND ROSE'S CACTACEAE

This sumptuous series of volumes would have been a great addition to the knowledge of this intricate family had the time and money been spent by men interested in real botanical research instead of botanical propaganda, but nothing having the imprint of Britton can have much scientific worth because he injects his personality everywhere and all the time to the detriment of research. He outgreenes Green, and Greene was insane. The most objectionable thing about the Cactaceae is the wholesale creation of new generic names for various groups within older genera, new names based on trivial characters. Had these names been the result of new studies and discoveries in morphology, or plant growth, there might have been some excuse for it, but there has been practically no such work, it is simply a rehash of old material, after the fashion of Greene and Rydberg.

Coulter and Rose in Cont. N. Herb. 12 441 following, take up recent Umbelliferae and make certain comments. In reference to my strictures on their work they dodge the whole matter by declining to take up my criticisms, or reply to them, hiding behind the following buncombe: "This wholesale merging of distinct groups of species is based on a conception with which we cannot sympathize," etc. It has been evident for years Rose has lost all conception of genus or species, and for that reason cannot sympathize with those who attack his failures, but this dodging will not help him or prevent an examination of the grounds for his creating new genera. There are certain ecological facts that cannot be escaped, and the field botanists will force this recognition from the closest botanists whether they want it or not. We are tired of this assumed superiority, which is pure blu.... It is too bad that my estimable friend has passed on and cannot answer. In my strictures on his work I found fault with the generic character of his proposed new

genera and showed just where they fell down, and it was up to him to show where I was mistaken, which of course he could not do. I have had the advantage of Rose and Coulter in having spent the greater part of my life in the region where these genera grow, and had studied the plants growing and knew of their intergradations. It might do with eastern botanists to swell up and assume superior knowledge, but we western men, who really know the plants as they grow, cannot be bunkoed by this kind of bluff.

J N. Rose. The announcement of the death of Rose comes as a shock to his old friends. As a man and citizen Rose was a prince. No one could know him without liking him. When I went to Washington the first time in 1894 he at once took me under his care and piloted me around to the various workers and introduced me to them all, Dewey, Pollock, Merriam, Palmer, Miss Vasey, Mrs. Baldwin, Miss Clark, and many others. Then over to the Botanical Seminar where I met Irwin F. Smith, and others in his department. Then over to the Corcoran Art Gallery, and to the Presbyterian church of which he was a member. Then to tea at his house, where I met his family. He was always a helpful botanist, ready to assist in naming anything, a self-abnegating man. His chief defect was lack of assertiveness, willingness to be dominated by those above him, just so long as he could work. Naturally his ideas of specific and generic differences was good, but in trying to keep up with progress he followed the bell wethers too closely for his own good, till at last he lost all sense of botanical fixity in either genera or species, and his work on Cactacaeae was a riot. Naturally he was a conservative, much as his later work would seem to disprove this. No work that he ever did was equal to that on the Umbelliferae, and this was his first work of any importance. He was slated for the position of botanist of the Department of Agriculture, and was next in order after the death of Dr. Vasey, but he was ruthlessly pushed aside by Coville, just as was Dewey by the scoundrel F. Lamson Scribner, from being head of the work on grasses. That Rose should have remained in the Department of Agriculture and Smithsonian Institute as long as he did is a marvel, for those two institutitnos are the Kilkenny cats of the Government, where each man is clawing all his neighbors in the mad scramble to get to the top. When I was temporarily connected with the Department of Agriculture in 1894 one of the men came to me and said one day, "If you don't quit working so hard you will lose your job." I replied that that was impossible for I was employed on an explicit understanding that my job was to end in a year. Further I asked why hard work on my part would produce antagonism. He said, "You discredit the rest of us." I had seen that laziness was a prime requisite in the department.

NELSON'S FLORA OF THE ROCKY MOUNTAINS

Since my last Contributions several floras have come out, Nelson's being the first. This is supposed to be a revision of Coulter's flora, published many years ago, which was the outgrowth of his and Porter's flora of Colorado. Coulter's Flora was simply a compilation, as was his Flora of Colorado. It contained no critical study but was valuable because it gave the locus of publication of various species of the many U. S. R. R. Surveys. Species of Watson, Gray, Torrey, and Engelmann. Then Nelson comes along and with much bluster about the "Rocky Mountain Herbarium," a small collection of Wyoming plants made mostly by himself, he attempts to get out a real Flora. The one glaring defect of Nelson is his perpetual blundering, and lack of ecological knowledge. He poses as a conservative, not a splitter like Rydberg and Greene, but in his own species he is as bad as any of them. Then a very reprehensible thing is his flatulent praise of the men he is afraid to antagonize, and the total lack of any real appreciation of brother botanists. For example he slops over in acknowledgment of obligations to those two men when he does not even mention the one man to whom he was the most obligated for information and botanical material got in exchange through years of correspondence. Possibly there was method in his neglect, for that man was also preparing a similar flora and had been at it many years before Nelson was known in the West at all. Another feature of his work is the many omissions of well known species. At least 50 that grow in the region that Nelson knew nothing about. Hitherto I have refrained from criticism of his work for personal reasons, but of late there has come from the University of Wyoming continued disparaging remarks from his protegees, until forbearance has ceased to be a virtue. For example MacBride, a protegee of Nelson, attempted to do a little work on the borages, and in that work criticised my use of the name Krynitzkia instead of Cryptantha in making certain new names for borages. It ought to be perfectly plain to a novice that I do not use nor intend to use any of the new generic names till I know w hether they are worth recognition, which requires intensive studies which I do not intend to take up except in order. I prefer not to slop over like the Wyoming folks do, and I do not intend to ask anybody's permission when I do it. Nelson, with his poor equipment in material and experience, might attempt it, but I won't do it. Real botanical work is not favored by petty jealousies. I have no sympathy with the Brittonian method of finding fault with coworkers in any field. It gets no one anywhere. There is no field anywhere for such men, but small fry are always trying it. So far as Nelson's work is concerned he will in due time reach his proper level without my assistance. In fact has already done so. But his botanical kids will still think they are grownups.

Coulter published what he called the flora of the Rocky Mountains. He did not know much about the ecological limits of the region. His was in fact a flora of Colorado with northwestern extnesion, exclusive of southwestern Colorado, about which he knew nothing. Nelson followed him in this interpretation. Ecologically the Rocky Mountains flora extends to and not through the Clover mountains of Nevada, thence southeastward through Utah to the Grand Canon in the mountains and northeastward to the base of the Uinta mountains along the plateaus, and thence southeastward through Colorado to central New Mexico. Rydberg in his last emission covers this area and more. The main aim of both men seems to be to skim the cream of the prospective buyers of botanical books, rather than to follow any ecological lines.

It would consume entirely too much valuable time to go over Nelson's book in full, so I will take up a family to show how his treatment works out. The Cruciferae. Stanleya pinnata he splits into three spurious species. He keeps up the Greeneian bunk of Schoenocrambe which is an Erysimum. He does not know the di...erence between Thelypodium and Streptanthus, the last two of his species of Streptanthus are Thelypodia. He recognizes twice as many species of Lepidium as exist. He does not even seem to know of the existence of my L. scopulorum, one of the very few valid species. Thalspi alpestre he splits into four species. He does the same with Cardamine cordifolia and Physaria. He follows Greene and Rydberg in splitting Capsella in two, not knowing that Hutchinsia procumbens often shows the real Capsella pods as sports of the usual form. In Camelina he does not know of the existence of C. microcarpa. In Draba he trots along behind Greene. He makes a blunder in quoting Greene's D. Mogollonica by calling it mongollonica. On page 223 he quotes Greene's Draba graminea as a possible synonym of D. chrysantha, when in fact it is not a Draba at all, but a Braya. He goes o... on the first year blooming perennials as though they were annuals, as do both Greene and Rydberg. In Sophia he also follows Greene in splitting. In Arabis he gets tangled up in the botanical woods. He puts Greene's A. formosa far away from A. Selbyi Rydberg and does not even mention my A. pulchra of which these are synonyms. Nor does he ever seem to have observed the peculiar pod character of this species. He keeps up the old distinctions on which Gray based Erysimum, when any tyro should see that E. cheiranthoides and asperum cannot be congeneric. On page 228, in describing A. aprica, he says the stems are 1.5-2 cm. long instead of dm. long. He does not even mention Parrya macrocarpa, which is common in the Uinta mountains. This lack of exact knowledge is characteristic of the entire book, and vitiates its worth decidedly.

LIFE ZONES

Soon after my arrival in California to stay, in 1923, when I had gotten a clean-cut idea of the ecological conditions in southern California, and of the views of Clements, Hall, Grinnell, and others as to life zones, it became evident that either they or myself were radically at fault in their conception of life zones. I have discussed at length the subject of life zones in Contributions No. 13, and my reasons for rejecting Merriam's terminology. There is no living botanist who has covered as much of the ground in dispute as I, and for this reason I am prepared to defend my position. The various belts of Hall as given in his discussion of the botany of the San Jacinto Mountains are drainage areas for the most part, good for local consumption but worthless for wider use, and of little zonal significance. As I have stated elsewhere temperature must govern the limitations of life zones, though humidity is the chief factor limiting plant formations. In selection of zonal guides (certain species of plants) we have to take into consideration the actual reactions of those guides to all ecological factors, in order to weigh the evidence they give of the life zones in which they are found so that we can evaluate the evidence they give. For example, the aspen is a very valuable guide to the Upper Temperate life zone in the arid west (Wyoming to Texas and west to California, Sierra regions) but worthless wherever the humidity is high, such as in western Montana and westward. Pinus ponderosa is a good representative of the Middle Temperate life zone in the same region except in the southern Sierras and in Montana. Juniperus Utahensis is a fine representative of the Lower Temperate life zone throughout except in southern California, where its variety Californica, if it be a variety, goes far down into the Tropical. Larrea Mexicana is the best zonal guide we have for the Tropical, and never fails to tell correctly the life zone in which it grows. But the Larrea does not grow on the western slope of the Sierras nor on the plains (coastal) because of the high humidity, but its place is taken by Adenostoma fasciculatum. An acceptance of these facts will lead to the unraveling of the apparently inextricable tangle in which the botanists and zoologists of California are engulfed. At a later date I may take up in detail the various areas affected but this is not my object here. As is well known Merriam placed the whole Larrea belt in the Temperate life zone, calling it Lower Sonoran, a misnomer, for it is largely crowded out in Sonora by Leguminosae. But wherever local conditions permit the Larrea grows as far south as central Mexico, and always in the Tropical life zone. If the California botanists were to extend the locally Californian terminology of "Subtropical" it would include the entire area where the Larra grows. But this would completely disrupt their life zones. For at the south the Larrea grows side by side with the Papaya, persimmon, sugar cane, date, and other

truly Tropical plants. So they must either discard this plant as a zonal guide, and do this arbitrarily, and without ecological reason, or change their conception of life zones as I have done, which is the better way. Now the practical man will ask, "What is the use in scrapping over these things?" Well, the reason is that it is of fundamental importance to know what life zone you are in if you are to try to breed plants. Millions could have been saved had people known what I know now about life zones. But they went ahead and tried to grow plants that were not adapted to and could not endure the conditions. In addition their theories led them to suppose that certain desirable plants, such as dates, could not be grown in certain areas because of extreme aridity, when a very meager idea of zonal conditions would have told them that dates can be grown wherever the giant cactus grows, or the ochotilla. This also applies to the fig, sweet potato and the palms. Brandegee in discussing the distribution of the flora of Lower California tries to separate the truly Tropical from other zones by geographical limitations, and the attempt falls flat. Goldman also does the same in discussing the areas of the Cape region. The attempt to keep up spurious limitations of Merriam leads him into all sorts of confusion. If there were any particular significance in the limitations proposed by Goldman and Brandegee the same things would be observed on the mainland eastward on the other side of the gulf, but they do not exist there. There is no place from Nogales southward where you can put your finger and say "Here is one zone and there is another" and reinforce the statement by citing the plants growing in those areas. The giant cactuses Ceresus titan., C. calvus, C. Pringlei grow indifferently throughout the region from the Cape region to Guaymas, and though there is a marked difference in the flora the feathering out is so gradual that no limitations can be found. The peculiar flora of central Lower California is due to the isolation in recent geological times rather than to any zonal causes. And the strange forms are manifestly developments of indigenous plants, such as Idria columnaris, which is nothing but a peculiar Fouquieria, Yucca valida is nothing but a form of Y. australis. There are, however, a number of species that have reached such fixity as to deserve recognition, such as certain Rhammaceae, Burseraceae, Euphorbias, etc. The giant cactuses, so far as I can discern, all belong to one specimen of Cereus such as C. calvus, Pringlei, Titan. This is also true of the Washingtonias, all modifications of W. filifera. The Erytheas seem to divide into three fairly well differentiated species, such as the green edulis, the blue armata and the pipestem-leaved Brandegei, all generically different from Washingtonia filifera. In the southern half of the peninsula the only Yucca is australis. The Agaves are still in a wild state of confusion, as are the oaks, because the species are founded on individual herbarium material mostly, by men who do not know what a species is.

There is no doubt that the Laguna mountains, which form the backbone of the southern end of the peninsula, actually extend up and out of the Tropical as to their actual summits. But up to the present time no real study of zonal conditions has been made in them. In addition there has arisen much confusion as to what are their limtations. The term

Victoria mountains can apply only to an insignificant sub range near Cape St. Lucas, and the term Sierra Giganta can apply only to a high area north of La Paz. But this does not reach high enough up to have any special significance, compared with the great Laguna area.

I believe that it is absolutely necessary for any student of ecology to be familiar with the limitations (morphological) of each zonal guide so as to give due credit to the evidence obtained thereby, and when this is done this guide becomes of inestimable value in limiting zonal boundaries.

NELSON AND LIFE ZONES

Nelson, head of the U. S. Biol. Survey, in his memoir of the American Academy on Lower California, tries to perpetuate Merriam's monumental blunder in life zones by keeping up Merriam's system of separating the Temperate from the Tropical, calling the life of the lower part of the peninsula Tropical and drawing the zonal limits at least 500 miles too far south. In addition in his map he makes another serious blunder in mapping the life zones of southern California where he represents the entire littoral flora and interior flora up to the bases of the Sierras as "Upper Sonoran," when in fact it is Merriam's Lower Sonoran, which in turn is truly Tropical, as shown by me in Contributions No. 13. Grinnell also has made much the same blunder in his discussion of the zonal limits of northern Lower California. The reason for this is that neither person has taken into account the annual temperature of the regions dealt with, which is in excess of 60 degrees Fah. Most of the botanists of southern California have fallen into much the same error, all because they did not find a suitable zonal plant to check up on the western side of the mountains, where the annual humidity was so high. On the eastern side of the mountains, the desert side, the Larra is a conspicuous zonal plant, serving well to separate the Lower Sonoran of Merriam from the Upper Sonoran of Merriam, whose characteristic plant is Juniperus Utahensis. Now on the western side of the mountains, because of the high humidity the Larrea is not found, but its place is taken by Adenostoma fasciulatum, which is an admirable zonal plant and enables the acute observer to draw the limits of the zone nicely throughout the entire area as far north as Eureka, California, and enables one to correlate the other plants in their proper zones. This reveals the fact that the flora of the plains of California from San Diego to Eureka, California, including the great inter valleys, is Tropical, that is, Lower Sonoran, up to an elevation of 5,500 feet in the San Bernardino and San Jacinto mountains, and about to Colfax east of Sacramento. Hall and others have tried to dodge the matter by devoting much to what they call the chapparal belt, which is nothing but a drainage proposition, having nothing to do with life zones.

I have recently returned from a long trip throughout the region covered by Nelson, and can say with precision that if the Larrea and Fouquieria are not Tropical plants then there is no Tropical. About that I shall treat more in detail elsewhere.

ZAUSCHNERIA

Zauschneria. In the American Journal of Botany Vol. 16 pp. 58-68 Martha Hilend publishes a carefully prepared monograph of this genus. The only criticism I would make on it is that her conception of species is not the correct one. The result is that she recognizes four species where there seems to be but one. I have grown the California form common in the mountains of southern California, and the form which grows in Utah, in my garden for years. The variations that appear in the plants as they grow are entirely too wide for recognition of any but one species. She freely admits intergrading of all the species known to her, but in spite of that fact she upholds four species. This is not the traditional conception of species.

It goes without saying that everyone has a right to publish anything he sees fit, the same right others have to criticise whatever is publsihed. But there are certain things which long observation in the field show to be true, and if there is anything established it is in the main species are well defined in nature. A few species and a few genera are in a state of flux. In addition there is more or less hybridizing in related species and some genera. But the fact of the status of a species is determined by observation. But when there is constant gradation between so-called species, the conclusion is obvious that they are not good species, and any other conclusion leads to chaos. The person who follows such a course must land in the camp of the splitters, who in the end commit botanical suicide.

COLLINSIA

Collinsia. Vesta Newsom, of Pomona college, has recently published a monograph of this genus. It appears to be a very conscientious revision along accepted lines. I have not yet had the time to go over it critically to determine its real value, but it appears to be a piece of work well done.

TANTILLAS CANON

Tantillas Canon. This locality where Orcutt got several types of new species has been a region of much fruitless search for years, and no one has ever been able to find it. Trelease speaks of the "Tantillas mountains" but there are no such mountains. One author speaks of Tantillas canon as being a few miles south of Campo, but no one has been able to find any such canon south of Campo. In fact there is no such canon there. Then the question is where is it?In May 1928 I set out with Mr. Reed of Riverside to find this mythical region. We went direct to Mexicali, hoping to find someone there who could direct us. We found two men old time prospectors who had tramped the entire region for years back, and who knew every canon. Mr. Gonsalez the sheriff of Imperial Co. whose residence was in Calexico volunteered to solve the riddle for me, he said there is no such canon. But there is a Tanqui canon, where the first palms south of the California border grow, and

he stated that this might have been called Tanquilla canon by some. Tanqui canon means the canon of tanks, water-holes, and Tanquillas would mean little tanks. And this is what is found at Tanqui canon. The significance of this canon lies in the fact that this is the first and only place where water is to be had south of the border, and therefore would be the rendesvous for men traveling by burro. It was for a long time an Indian settlement. There are two groups of palms, the first a little niche in the range where water seeps and where about 40 palms grow now. None of these trees is over 30 feet high. Thy were fruiting copiously when I was there. All belong to the typical species now called Washington filifera, and none are like the var. robusta. The petioles vary from very spinose to almost bare of spines on the same tree, and the leaves are very filiferous. The flowers seem perfect, but few of them set. The flowers are about ¼ inch long and are white. From beneath each bract on the rope-like peduncle arises a panicle of flowers which is about six to 18 inches long. The floral cluster droops and is 6-8 feet long, longer than the reflexed old leaves, being composed of about half a dozen panicles and each panicle subtended by a long sheathing bract which splits with age. The lower bracts are often a foot or more long. The leaves are apple-green, the blades being about 2 feet long, and each section copiously filiferous with white threads.

In the Botany of California vol. 2 p 2II, and in Proc. AM. Acad. II 146 I867 Waston first uses the term "Tantillas Mountains". So to the illiterate Dr. Palmer rather than to Orcutt belongs the stigma of inventing the mythical canon, though Orcutt used the term "Tantillas Canon." Palmer was notoriously ignorant. The thing that arrests the interest of botanists is the type locality of several new species attributed to Tantillas Canon by Orcutt. It is now certain that Orcutt did not get the new species accredited to the canon at the tanks, Tanqui Canon, but on the road between Campo or the Valley of Palms and the Canon, or in going over the range to the south of Campo. The exact locality cannot now be determined till someone follows the old trail from Tia Juana to the tanks and at the right season for plants, and collect botanical species there. Brandegee in Zoe, 88 speaks of "Cantillas Canon" as being a few miles below the boundry near Campo, but there is no such place.

CLEOMELLA

I confess complete sympathy with the attitude of Parish in his criticism of Payson's treatment of this genus, only Parish was too mild. Payson seems to have had very little experience with the genus, not enough to give him any proper idea of the effect of ecological conditions. I also confess decided opposition to Robinson's treatment in the Synoptical Flora. An example of the latter is where Robinson speaks of the absence of stipules in the genus except in obtusifolia. Now I have examined about all the species and find stipules in all of them, but they are fugacious, but readily seen in young parts. Another case is where Robinson speaks of certain species having "axillary flowers". So far as I can find most of the species have the lower flowers axillary. But this character varies apparently in the development of the individual. An example is in C. Palmerana Jones. The type material is relatively young; the main floral axes not yet fully developed. This makes the flowers seem to be peculiarly axillary. Just the reverse of the case in C. longipes its nearest ally. The type of C. nana Eastwood is from almost the exact locality where C. Palmerana was gathered. At the time I gathered C. Palmerana localities were not so definite as now. It would now be called "road to Courthouse Wash." In those days Green River was the only town. Even Thompson's Springs was only a railroad name then. Probably Valley City would be the best name for the type locality now. I some years ago and after went to the type locality to study further my C. Palmerana and found only the form of Miss Eastwood. No real revision of the genus can be made till it is grown under normal conditions and variations noted in the field. The attmepts to base characters on the comparative length of the filaments, and stipes are puerile. The development of horns on the pods is a matter of maturity only. Rydberg, who knows nothing of ecology and cares less is expected to make species on bug holes and accidental variations, and few people take him seriously any more. His C. cornuta founded on a specimen of mine is an example.

Taking up Cleomella as treated by Payson we find him splitting C. longipes into Hillmani Nelson and C. Macbrideana Payson. My material from Reno which includes all of Hillman's being the type of Hillmani. Rydberg takes my specimens gathered at Cainville, Utah No. 5656 as the types of his C. cornuta. This I had referred to C. longipes. The specimen is beginning to be mature, having a few ripe pods below among the leaves. It has the same kind of leaves which mainfestly place it with the longipes group. But the bracts of the inflorescence are all reduced to small and hyaline scales except now and then a natural leaf-life bract. I find the same tendency only once in a while in longipes where most of the bracts even to the very tip of the raceme are green. There seems a trend in the genus for pods to be oblately diamond-shaped, one group having the tip truncate with greatly developed horns on each side. The other group has the pods wider below giving more or less of an ovate outline, but horns variably developed. Now cornuta

has the pods of the latter group and the leaves of the former. The former group has flat and wide leaflets very obtuse to retuse. From the leaf structure I would at once place cornuta with longipes where I have always put it. Then we have Miss Eastwood's C. nana, got at the type locality of C. Palmerana which belongs here with the latter, and which has the scale like upper bracts just as in C. Palmerana. Miss Eastwood's specimens of C nana are evidently young with pods not yet fully developed, and to my mind are certainly C. Palmerana, which in turn may deserve separation from C. longipes. C. Montrosae Payson, from the leaves would seem to belong with C. oocarpa. To this species also belongs C. plocasperma and Coville's proposed stenosperma which Payson ignored. Then we have C. obtusifolia to which belongs C. taurocranos Nelson, and the var. pubescens Nelson which is a form of the type. What we shall do with brevipes and gracilis I will leave for more field work. There is no doubt that the splitters are seemingly justified in making so many of Cleomella, for the characters given seem abundantly distinct at first sight, but the more material one has the less weight he gives to distinctions recognized by Watson and Gray. It is manifest that the developemnt of filaments is a matter of little weight. The leaf characters would seem to be more permanent. But when we come to study them we find them varying toward the linear group, but after all can it be possible that longipes can include cornuta and Palmerana? If so we shall have to reconstruct our ideas of Cleomella. The distribution of the genus is sporadic. On page 38 Payson speaks of C. "refexa". What he means by that remains to be seen. There is no such species so far as I can find. I am convinced that too much emphasis has been placed on morphological characters, and that ultimately we shall have to kill more than half of the recognized species. But this can be done only by plant breeding. There is nothing to show that C. brevipes is anything but depauperate form of parviflora. C. gracilis Brandegee is probably C. parviflora. C. Mojavensis Payson is manifestly a form of plocasperma. C. Hillmani is of course C. longipes.

Recently I have had an opportunity to study certain species in the field to determine the relative value of specific characters. The species observed are obtusifolia and plocasperma (oocarpa). Certain vegetative characters are constant. C. obtusifolia always has the short obovate and folded leaflets, and on the young parts are the papery and hair-like stipules at least, though mostly the plants are conspsicuously pubescent throughout and the stipules very prominent. The stipes are always reflexed and the styles long. The pods vary from obliquely diamond-shaped to almost transversely linear because of the development of the horns or valves. The most marked character is in the habit which is prostrate, forming mats often 4 feet wide on the ground because of the multitude of branches spreading out wand-like over the ground. The flower clusters are almost sessible and innumerable. Once in a while the central stem rises erect several feet but always surrounded by the spreading branches. No other Cleomella has this habit. Cleomella plocasperma on the other hand had the habit of Cleome lutea, that is, erect

and branching widely in the middle, each branch terminated by a long raceme of yellow flowers with green and leaf-like bracts. The plants are often 4 feet high, growing in sand, never in alkaline clay, and having like all the other Cleome and Cleomella species the apparance of being immigrants. Usually the lower leaves have fallen and the stems are bare for a foot or two above the ground. The development of the pods is a matter of humidity at the time of ripening. Nearly always the pods are ovate in outline during the dry summer, but the earliest pods (found subtended by leaves) have the horns developed. Certain groups occur in the genus. The group having the pods widest below the middle contains C. cornuta and plocasperma; the group having the pods widest above the middle embraces the other species. C. Mexicana I do not know. This may belong in the first group as it is described as "globose-ovate."

Cleomella brevipes is represented in my herbarium by various specimens but I can find no character separating it from C. parviflora. Miss Eastwood's C. alata is manifestly the same thing.

CRUCIFERAE, BY PAYSON

In a recent revision of certain Cruciferous genera Edward Payson, a graduate of the University of Wyoming gives certain views which differ from the accepted ones. The question is "Are his ideas based on correct scientific grounds." His chief reason seems to be discoveries in genetics, but to the casual examination they seem to be an attempt to make a case out of little or nothing, special pleading for a purpose.

The first question is "what is his equipment?" A graduate of the university of Wyoming which is presided over by Aven Nelson who is without an exception the worst blunderer among western botanists, and without ecological experience sufficient to conduct such studies. He (Payson) has had little field experience. His work is that of a closet botanist. This does not necessarily imply that he is incompetent, but such botanists have, much to the detriment of systematic botany, been altogether too much in evidence. Then do his ideas on phyogyny meet the approval of field experience and of other botanists?

On p. 7 he summarizes so called evolutionary tendencies in Sisymbrium as follows:

(1) An annual habit of growth is more primitive than the perennial.

(2) Astipe or gynophore is believed to be a primitive character.

(3) A long, terete pod is more primitive than a short or compressed one.

(4) In the primitive species the petals were probably purplish rather than white or yellow.

(4) This idea was held by Gray as is shown by his systematic keys.

Many others hold the same views. Payson is adding nothing to accepted theories in this. But is the idea a true one? The annual habit is the product of seasonal influences mostly cold of winter which is a recent element geologically. All the primitive species of plants were perennial. The annual habit is the product of the attempt of plants to adjust themselves to new conditions, and in adapting themselves to them certain organs and appendages became useless and aborted. Therefore the absence of certain organs is more a reversion than an evidence of primitiveness in annuals. The problem could be attacked in another way by checking up the development of special organs in annuals.

Are annuals specially deficient in dissection of leaves or pubescence? We think not. Are they lacking in essential oils? Certainly not in the Capparidaceae. The Cruciferae nearly all lack glandular appendages, and yet they are assumed to be derived from the Capparidaceae family. But in all probability the reverse is the case, in spite of the special floral characters. When we come to study the genera of Cruciferae we find a higher development of floral characters in those genera assumed to be nearest the Capparidaceae, namely Thelypodium. Stanleya, Streptanthus, Caulanthus, than in Draba, Arabis, Sisymbrium, Erysimum, many of whose species are annual, while the enumerated are with few exceptions annuals or biennials. It is true that Payson says conclusions cannot be based on small numbers of species, but he goes ahead and does it just the same. Very few of us older field botanists would even now have the temerity to try to explain genetic origin of western plants, but inexperienced young men feel competent to do it. To go into details on this point would take too much space here.

(2) That a stipe is more primitive and its absence less so would be very hard to prove when we consider the stipitate genera and species. That the specialized genus Stanleya is lower than Draba, Arabis, Lesquerella, etc. I do not believe, or that the still more specialized genera Caulanthus, Thelypodium, and Streptanthus are lower than they, would be unique. In the nature of things one is going far back to assume that stipitate pods was the rule in primitive species, as far as he would go if he assumed that pine cones to be primitive should have had definite axes between the scales, when the probable fact is that when the pines originated the axis had already been aborted.

(3) I fail to see any cogency in the assumption that a long and round pod is more primitive than a short and flat one, for the reason that the last specialized pods are mostly short, at least not elongated, and are not terete. Most of the terete pods have a tendency to the development of secondary ribs along the middle of the valves as is shown in Erysimum, Caulanthus and Sisymbrium, which is distinctly not a primitive character.

(4) Very likely Payson will say that his conclusions as to these evolution factors is meant to apply only to the Sisymbrium group. In reply I would say that this throws the burden of proof all the more on him. Under this head he assumes that the original species were

purple-flowered rather than white, Why? presumably to strengthen his reference of certain Thelypodia here. I have never yet seen a yellow flowered species except in Stanleya. All the rest are greenish yellow if at all so. Practically all the species of Thelypodium, Caulanthus, and Streptanthus have petals fringed with purple the body being greenish and whitish, this includes Streptanthus longirostris which is a good Streptanthus, where Watson placed it at last, and apparently is congeneric with T. Cooperi and deserti. His reference of Thelypodia to Sisymbrium is made under excessive strain, and he still more disrupts that genus to do it. It is not a question of the existence of taxonomic difficulties. These we all admit, but the question is on the expediency of treating them. Rydberg in his usual way cuts the Gordian knot by making new genera, but this does not at all solve the question of relationship. It is still there. It is a short cut to avoid explaining the genetic tangle, and it is not scientific, but it catches the eye of the ignoramus, who at once begins to toot the wonderful insight and discoveries of Rydberg, when in fact he is only repeating what we older botanists saw and published when he was in knee pants.

Taking up Sisymbrium as Payson treats it we find it sometimes hangs on white or yellow flowers and always on a stigma lobed at right angles to the valves. What he would do with those species of Thelypodium which have no lobed stigmas he answers by assuming that they would be lobed if they had a chance, and would go where he has placed them. May be so, may be not. He also says that the septum is never that of Thelypodium. But an examination of my T. elegans shows the same cell arrangement often as in other species which he retains in Thelypodium, this is where the septum is narrow, then the cells are contracted and elongated. This distinction shades to nothing in this species, doubtless it would also be in T. ambiguum. It is difficult to reconcile one's views of Sisymbrium to admit such clear species of Thelypodium as T. elegans and ambiguum into it. There seems some reason for putting S. deflexum there, which has stigmas lobed both ways, and the linear-leaved Thelypodia of the Arizona region, there, for they are somewhat aberrant in Thelypodium, then the pods have the tendency to thickening of the centers of the valves into ribs as in S. altissimum. I certainly would not place Thelypodium Cooperi in Caulanthus as it along with my T. deserti seems to be more congeneric with Arabis longirrostris which I think belongs best in Streptanthus. The thickening of the pods is still not enough to make it round or to destroy its flatness. To me there seems a lack of consistency in going to such lengths as to unite half of Streptanthus with Caulanthus, which Payson does, while keeping up Sisymbrium on stigmatic lobes which are not even present in some of Thelypodium. It may be contended that Watson and Gray did not solve the problems of relationship by their treatment of the family. We grant this without a moment's question, but what of it? It is no reason why others should do worse. In certain quarters there has been for a long time a tendency to discredit Watson's work, but he had more ecological horse sense and good judgment than any of his succes-

sors, and his monumental botany of the 40th paralle has never been equaled for quality of work since, though it has been followed as a guide by men too selfish to give credit where it belonged. He was a pioneer. Had to solve relationships entirely unknown to others. A study of the genera of Cruciferae to determine just how much worth is in the work of Payson has revealed to me certain things which lack of time had prevented my knowing before. For example, Erysimum and Sisymbrium are simply hodge-podges. It is out of the question to consider E. cheiranthoides as congreneric with the rest referred to it. Therefore I incline to keep up Cheiranthus. Sisymbrium is more muddled, and Payson only contributes more fog. In his treatment of Thelypodium he makes a great ado about the markings of the septum as distinctive, but the sections here shown reveal his fallacies. But he fails to consider the septum of the other genera. Climatic influences seem to determine the peculiar markings largely. At the north the veins on cell walls are nearly always crimped, at the south nearly always straight or nearly so. Individual species vary much in this regard. It certainly is amusing to see Thelypodium Cooperi put in Caulanthus along with Sisymbrium reflexum, and see Streptanthus longirostris which seems almost congeneric with it (Cooperi) put in Streptanthella. Mr. Payson does not seem to regard certain morphological characters as of any particular value, such as the peculiarly stout and rigid floral peduncle, so characteristic of S. altissimum, and reflexum. Nor does he seem to know how greatly the two species differ in the meshes of the septum. S. altissimum is properly called the type of the genus Sisymbrium. It has false partitions between the seeds, remarkably developed walls to the pods, as well as woody and very rigid reflexed pedicels, quite different from S. canescens group, while the S. reflexum group is intermediate, then all these are annuals. Watson sidesteps these complications by saying that the Cruciferae form natural groups, his use of the term natural being intended to mean evolutionarily natural, since he was a believer apparently in natural selection as the causative element in plant development.

Speaking of the idea that annuals are more primitive than perennials, an idea which I certainly combat, the great genus Astragalus is a conspicuous example of the falsity of this fetish, practically all the highly developed species of this genus are annuals. This can be seen by reference to my monograph. The fact that this is characteristic of Astragalus does not prove that it is a universal rule of course in all genera, but presents presumptive evidence therefore.

It is evident to western botanists that the genera Thelypodium, Stanleya, Streptanthus, and Caulanthus are developments of very recent times, from older genera of the Sisymbrium-Arabis type, all of which are stipeless. This therefore leads to the assumption that stipes are not primitive as Payson has assumed, but the last word in specialization. It is going far too long a distance into the unknown past to resurrect the axial habit and call the stipe a long lost pedicel, as Payson does. Geological history shows only too well that certain types of forms early became fixed and were built upon in the later genesis of species without

reverting to the types from which those types originally came. Just as w have in the genesis of organic chemical compounds where the ammonia radical became to all intents and purposes an element like sodium, oxygen or hydrogen, and was built upon to form the complex derivaties of Carbon. There are various ways of getting at the primitive types of modern vegetation, but theoretical assumptions do not cut much ice in the matter, particularly when made by young men with little experience. Ultimately the matter will be settled, but not till after exhaustive field work, by men who know ecology in all its ramifications.

Taking up certain species of Thelypodium, it is impossible to follow Payson in his recognition of species or genera. He puts T. elegans in Sisymbrium because it has stigma lobes transverse to septum, but he puts T. ovalifolium the cotype of which is in my herbarium and all of which I collected at Panguitch lake Utah, in Thelypodium because it has no stigma lobes, but the specimens in my herbarium have lobes both transverse and parallel to septum, and therefore the species according to him is a form of elegans, but really is T. sagittatum. There are specimens in my herbarium with both transverse and parallel lobes on the same plant. This shows the extent to which Payson will go in trying to establish his foolish reference of species of Thelypodium to Sisymbrium whose species S. altissimum cannot be congeneric with any of them.

Taking up T. integrifolium we find him splitting it up into T. affine, and rhombifolium, and the var. gracilipes. We find him making much of the flattened pedicels to keep up rhombifolium, but he is inconsistent in his reference of specimens. My fine material from Moab which he refers to rhombifolium is typical var. gracilipes with stipe 2 mm. long and linear spikes, and has conspicuously flattened pedicels. T. lilacinum seems to be another of the fictitious species, the distinctions do not hold. T. affine cannot be upheld on the characters given. I see no other way than to unite the four species.

Payson says on page 281, in quoting localities for Thelypodium lilacinum var. subumbellatum "Hot Springs Wyoming Jones." I never was there, and no specimen of mine is in any herbarium with such a label.

Payson follows Greene in putting Sisymbrium reflexum into Thelypodium ignoring completely the strikingly similar pods to altissimum in their structure and cell character and apparently not seeing the relationship to Arabis longirostris and Thelypodium Cooperi, etc. T. lasiophyllum does not have the septum cell structure of any other Thelypodium, but this is variable. The septum is thin as in altissimum but is bulged into pockets as in that species by the thick seeds, but the flowers more nearly resemble those of Arabis longirostris in color. The inflorescence reminds one of Sisymbrium officinale but is less strict. The two forms with erect pods and reflexed ones if they did not grow together would create a distinction, supposedly specific, but I fail to see any thelypodioid characters warranting placing the species there. The preponderance of characters is sisymbrioid. There seems to be a difference in the forms on the Coast and the interior in the septum. The Coast one being more sisymbrioid. Both he and Robinson say that my Thelypoddium

neglectum is mixed, founded on two genera, but my type specimens are clearly S. reflexum, and not mixed.

Payson's treatment of Thelypodium, Caulanthus, and Streptanthus well illustrates the foolishness of a closet botanist trying to monograph a genus. He evidently has had little first-hand acquaintance with the genera. Watson in erecting Caulanthus made an admirable statement of the differences. Caulanthus and Streptanthus stand firmly on the floral differences which are marked in the fresh plants, namely leathery petal claws wider than the blades which are rudimentary or mere prolongations of th claw. Thelypodium having thin claws papery and smaller than the conspicuous blades, and rounded pods. Caulanthus has the rounded pods and peculiar floral characters given. Streptanthus always has the flattened pods, often quite wide, and flowers mostly inflated, the only aberrant form being S. longirostris which connects with Thelypodium. The placing of lasiophyllum and Cooperi in this genus could not be worse, while the merging of Streptanthus with Caulanthus has no justification.

Caulanthus hastatus when critically studied in the field shows all of the characters of Caulanthus and does not justify being put in a separate genus Chlorocrambe of Rydberg, though the flowers are too small for Caulanthus. We do not expect anything else from Rydberg because he has no generic nor specific conceptions, his inspirational botany having gone flooey.

Lesquerella condensata Nelson. Payson in his treatment of this species pages 211 and 212 still further balls up things which were in a terrible mess before. Nelson in describing this species says it is the most common thing in and around Laramie in the spring, and that it is what he has distributed as Draba glacialis. Now what he distributed to me as Draba glacialis from Laramie is the var. laevis of Payson. Payson without any authority states that the type of L. condensata is Nelson's No. 4797 from Tipton Wyo. But in the locality where the type was described he (Nelson) does not mention Tipton but specifically does mention Laramie, and he does not mention 4797 as the type but does mention his No. 1218 as the type of the species, which is a part of the type of Payson's var. laevis. Nelson is always a blunderer but we cannot go beyond the original description for authority as to what was the type of the species when it is distinctly stated there as to what is the type. So the peculiarly hairy form still is unnamed.

Eventually there will be difficulty in separating this species from L. intermedia. The plant is common on both sides of the Uintas, the type grows on the northern side of this range. On the southern side of the range from Dragon (near Mack Colorado) I have found it as far west as Theodore (now called Duchesne) on the benches bordering the river. In this region the species reaches a better development where extreme forms have filiform stems 2-3 inches long with rhomboidal to oval leaflets, but varying to linear-oblanceolate, on long and slender petioles, and even the narrow stem leaves are on slender petioles. The shape of the stellate hairs is the same as in the var. laevis, but there is no tendency

to the pilose condition in any of my material. The flowers are in heads, rarely more than half a dozen in a head, and the pods rather corymbose, ovate, acute, decidedly flattened laterally when young and less so when old, white-stellate, with styles 1.5-2 mm. long, pods 3-4 mm. long, the slender pedicels are 3-4 mm. long and erect. Were it not for the wide leaves it would readily be placed in L. intermedia, for that has similar hairs. The pods vary from ovate to oval. If the caespitose habit were constant in certain species they would be better known, but where L. intermedia is either long-stemmed or acaulescent the habit is not of much account.

My particular reason for going into Payson's work on the Cruciferae is that I have for over a year been devoting all my time to a critical study of the Cruciferae, and incidentally have had to go over all of Payson's work in the family, checking up in the field as well as in the herbarium, to find just what is worth preserving and what is not, in his work. It is to be regretted that such a young botanist ever took up this family, but one is justified in saying that his work on Lesquerella is the least objectionable of all he has done on the family. It is always painful to have to go over the work of inexperienced persons in systematic botany, but their teachers seem to regard this as legitimate to portion out certain genera for them to muss over.

Payson was a lovable man, one whom everybody who knew him regarded well. His first work was rather crude, but he steadily improved as he went on. We all regret deeply his untimely demise.

NOTES AND NEW SPECIES OF UNITED STATES PLANTS

WASHINGTONIA, WENDLAND

This genus, proposed by Wendland as distinct from Pritchardia, in the year 1879, has been variously treated. The name antedates all others, but was foolishly thrown into synonymy by Sudworth to the assumed publication of a Washingtonia (Osmorhiza Raf) by Rafinesque, and called Neowashingtonia by Sudworth. Parish has shown the uselessness of the name Neowashingtonia. In the botany of California (1180) Watson proposed the separation of certain species as Erythea, and on the flimsiest of grounds. There is no treatment of the genus by anyone but Parish that shows any familiarity with the plants as they grow. Parish knew the genus as represented in the wild Washingtonia robusta of our Californian deserts, and he knew the other forms of filifera as cultivated in southern California. But he does not seem to have studied the floral characters much if any. So far as I can find no one seems to know if either Washingtonia or Erythea has perfect, or monoecious or deciduous flowers. I find that all the forms of W. filifera described below are either monoecious or dioecious or perfect. Whether the flowers are polygamous I do not know. The flowers are about 1 cm. long and white. The fruit is

black and about 4-6 mm. long and 3-4 mm. wide. The form Sonorae, as it grows in the Cape region of lower California is mostly staminate, rarely does one see a pistillate tree, or even a monoecious one. The leaves of all forms of filifera hang on for many years as a rule, but there are occasional exceptions where they fall off quickly and leave the trunks bare, at least in forms of Sonorae. A character that is common to all the palms is the production of subcutaneous rootlets which swell out the bark at the base of the tree and finally make it split as in Phoenix. When the leaves of filifera have fallen naturally they leave the trunk with very slight rings which are not sharp on the edges, as in the cocoanuts. Watson in his characterization of Erythea makes woolly spathes a generic character, as well as perfect flowers. The spathes of E. edulis are woolly, those of E. armata are perfectly smooth. The flowers of E. edulis are evidently polygamous or monoecious as are those of E. armata at least at times, but there are dioecious trees. The flowers of both species of Erythea are greenish white and 2-4 mm. long. The fruit of E. edulis is black and edible and about an inch wide. That of armata is half as large. The leaves of edulis fall off in 2-3 years, leaving sharp rings around the trunk, and exposing very conspicuous sheaths between the leaves which are about a foot wide. In E. armata these sheaths are less than half as wide but still conspicuous. The leaves af armata hang on for years as in W. filifera. The threads of filifera are not so conspicuous in Erythea as in most Washingtonias. The petrioles of E. edulis often have minute prickers, which seem deciduous. Those of E. armata are like those of Washingtonia filifera. There is not a character proposed by anyone for Erythea to separate it from Washingtonia that has any value at all, but there seems to be a character of value in the flowers (see beelow).

I can see no sound foundation for Cooke's genus Glaucothea. The flowers are the same as in Erythea edulis. The fruits are intermediate between Erythea and Washingtonia, and the leaves and habit are of Washingtonia.

It has been my privilege to see the cultivated forms of Washingtonia in southern California. I have also visited all the large areas where var. rubusta grows wild, and have also studied it in cultivation all over the region. I have also studied the genus all along both coasts of Lower California and on the mainland as far south as Guadalajara, through Sonora, Sinaloa, and Nayarit, and at the Cape. In Mexico the plants can hardly be said to be cultivated, except in the Mexican stupid way, having grown up along watercourses haphazard, the original seeds probably having been scattered by man after obtaining them from the canons of the adjoining mountains, and for the purpose of having the leaves nearer at hand for thatch, rope, and baskets. The Mexicans distinguish forms by the color of the wood, calling them "Palma colorada and Palma blanca, and Palma negra. W. filifera goes by the names palma blanca and palma colorada. Erythea armata and Brandegei are called palma negra.

The only form that grows wild in California is Washingtonia filifera var. robusta (Wendl. Gart. Zeit. 2 198 1883 as species). Parish Bot Gaz. 44 420 1907. It is a well marked form, and the best developed of

them all, the trunk at base being 3-4 feet thick and tapering to a foot in diameter at the tip, which is often 75 feet high. When in a state of nature this form is instantly recognizable by the great sheath formed by the dead leaves which overlap so as to form a perfect sheath in which the individual leaves do not appear. This sheath is 4-5 feet thick, and often 20 feet long. When the leaves have been cut off for thatch or by fire there is no certain way of identifying this variety. The leaf blades are 3-4 feet long, usually a little shorter than the very stout petioles. The blades split into many narrow blades that droop at the tip, but blades never split to the middle. This form is conspicously filiferous, the divisions tapering gradually to the tip. The petioles are inclined to terminate in triangular-acuminate prolongations into the leaf-blade, but vary greatly and the margins are hooked-prickly with stout and dark spines throughout or only below. The petioles are mostly 2-3 inches wide and an inch thick and lunate in cross-section. Many plants are dioecious, many monoecious. The globose-oblong fruits are hardly 4 mm. wide. The flowers are borne in long and interrupted panicles, in which the fruits droop, having alternate sheath-like bracts subtending each panicle, which bracts are tightly fitting and smooth and 1-2 feet long and 2-3 inches wide. The whole flower cluster is often 4-8 feet long and drooping. The nearly round peduncle makes good canes. The leaves are universally used for thatch, which fact accounts for the wide distribution of the species. The trunks often reach 75 feet in hight, and then are seldom over 6 inches thick. They are very rigid and seldom wave in the wind. The wood is very heavy, but porous. The trunks are about the only straight timber in the country and are therefore much used for rafters, house timbers, and corral poles. But I have never seen them sawed into plank. The rootlets produced from the lower part of the trunk in age seem to be a part of the wood and are very conspicuous in fossilized specimens, occurring in the desert beds of late Tertiary age.

The typical form of the species W. filifera (Linden Ill. Hort. Lem. 24 1877 as Pritchardia) Wendl. Bot. Zeit. 37 68 1879 is badly mixed in Bibliography both by Watson and the Kew Index. I am not prepared to maintain its distinctness from Pritchardia, since I do not know the species of that genus. I therefore assume that Wendlend is right in its separation. The typical form of the species is not the magnificent form (robusta) of our California deserts but a slender tree which grows in the canons of northern Lower California, and which seems to have first been introduced into cultivation. The trunks in this form are seldom 2 feet in diameter at the base in cultivation, and rarely reach six inches wide at the tip. The chief characteristic of this form lies in the relatively short leaves (blade about 2 feet long), which when old hang down and form a ragged sheath, unsightly to look at, where the individual leaves are conspicuous. The pleats in the leaves are relatively wider and do not droop so much, a form (W. gracilis Parish) having divisions shortly acuminate and with few threads on the margins. Seeds of this were the first to be cultivated.

Washingtonia filifera var. Sonorae (Watson P.A.A. 24 79 1889 as species).

This is the exclusive form in the southern part of Lower California,

and is the most graceful of the species. It has the trunk of typical filifera and the leaves of the var. robusta, but not so long, but each pleat in the leaves of the mature trees splits off from the rest of the blade at least to the middle and droops and, like the aspen leaves, is perpetually fluttering, and is long-linear. The threads on the margins vary greatly, and usually get tied into knots after a while, suggesting little nests, or fungus nodes. This form is either monoecious or dioecious or perfect. There seem to be far more male trees than female. This extends northward at least to Guaymas. All the leaves of all the forms of this speciies are apple-green. This variety has a wider range than the rest. It is abundant in the canons of the Laguna mountains, along the water courses and also grows among the live oaks on the hillsides about 3,000 feet altitude and up at least to 4,000 feet altitude. It is also common around all the settlements along the river beds, growing with the cocoanuts. It grows at tidewater at La Paz, where its roots extend down to the sea level.

The fruit of Washingtonia filifera as grown in southern California occurs in long and drooping panicles, the whole longer than the leaves, having strap-shaped bracts about a foot or two long and 2 to 3 inches wide and white, and very conspicuous beneath each cluster of flowers, the clusters hang racemosely from the whiplike peduncles, much as bunches of grapes, one cluster beneath each bract. The green fruit as it nears maturity is rather brick-colored, becoming when dead ripe a shining black, and a little oblately spherical and about 5 to 6 mm. long, with a juicy and sweet pulp about 1 mm. thick inclosing the single seed, which is almost reniform and hard and bony. The fruit is ripe in November, and the trees begin to bloom in June, as a rule. The trees appear to bloom every ten years or thereabouts.

The flowers of Washingtonia filifera var. robusta have the calyx cylindrical and with erect and very short lobes. The corolla lobes are reflexed abruptly at end of calyx and are pearly white when fresh, and about 1 cm. long, becoming dirty with age. The filaments are subulate and with versatile anthers linear and arched.

On Dec. 14, 1928, I had an exceptional opportunity to study the critical palms of our region, in company with Mr. Thackary, and with others of the Yuma Exp. stations. In the last two weeks the Washingtonias have come into full fruit, and seeds beginning to fall throughout southern California. This recent trip enabled me to see the type locality and type trees of Cook's Washingtonia Arizonica, and Erythea Brandegei in fruit. The specific margin between E. armata and E. Brandegei is very slight, and hinges on the panicle of flowers in Brandegei which is that of edulis, that is, an open and wide panicle of uniform structure throughout, about 3 feet long by 1.5 feet wide, and decidedly shorter than the leaves and on a short peduncle. The seeds are those of E. armata, and the leaves differ but little except that they are green and only slightly glaucous in Brandegei. Otherwise there is no noticeable diffrence in the two species. They have the same slender trunk, and narrow petioles, the bases of which hug the trunk closely and remain on for many years, the trees not being self-pruning as in edulis.

The seeds of Washingtonia Sonorae are exactly those of typical filifera, that is, 5-6 mm. long, about 4 mm. thick, oval-ovate to oval-oblong, black and shining or with a glaucous bloom, round in cross-section except a little flattened on the chalaza of the seed. The pulp is less than 1 mm. thick, is juicy and sweet as in E. edulis. When dry the seeds have a wrinkled coat from the dried pulp. The seeds themselves are decidedly flattened on the chalaza side and a little so on the other, chestnut-colored, round in longitudinal cross-section, and about 4 mm. long, and with hard coat. The chalaza is not in the middle of the side but nearer one end, and forms a scar, but not a pit as in Erythea. The inflorescence is a long raceme of grapelike clusters, the whole mostly longer than the leaves, and on a long peduncle, and mostly pendent. Each cluster has a conspicuous and white bract, 1-2 feet long by 2-3 inches wide and rounded on the end. The clusters of fruit are about as long as grape clusters, that is, rarely over a foot long, and dense or loose according to conditions, and a solid mass of hundreds of fruits. In the var. robusta some fruits are almost spherical, while others are normal.

Washingtonia Arizonica Cook is intermediate between typical filifera and the var. robusta, and has no character whatever to separate it from either specifically. About half the trees were self-pruning, the rest normal. The same fact was noticeable in W. Sonorae at the Cape. The humidity conditions of Arizona are such as to preclude Washingtonia growing anywhere except in moist crevices in the low mountains, and such localities are rare. No doubt there are other localities besides the S. H. mountains where this palm grows, but so far only the one locality is known and is about 30 miles east of the Colorado river, and at an elevation I should say of 2,000 to 3,000 feet altitude. Right beside it also grows Nolina Bigelovii, also Beloperone Californica. There was no alkaline seep evident at this place as is common in Californica where the palms grow, nor was any water evident. This locality is about 75 miles north of Yuma, and about 30 miles south of Quartzite (which is on the Blythe-Phoenix road). At Brawley I found some very fine fruit of the var. robusta which was normal filifera, but at the Exp. station, 12 miles north of Yuma, a tree there of robusta had spherical fruit, and the fruit was glaucous.

ERYTHEA WATSON

Erythea edulis seems to be very prolific and with flowers perfect or rarely polygamous, fruiting abundantly along the Californian coast where introduced. The leaves have at times a suspicion of being glaucous, but lack the marginal threads of Washingtonia filifera except a very few scattered ones. They hang on for a few years but do not form the great sheaths that the var. robusta does, though they would do so if they hung on as long. The perianth is very short, not over half as long as in any forms of filifera, oftentimes the leaves have short teeth along the base of the petioles, at other times are bare. The tree is a rapid grower. On the other hand E. armata seems to be dioecious for the most part if not entirely so. And the fruits half as large (half an inch wide) and less copious. The two species are abundantly distinct. Armata has conspicuous spines and glaucous leaves, and the perianth

like that of edulis. Erythea Brandegei is at once separable from all others (except armata) by the pipe-stem petioles and small leaves. The petioles of all the other species of th two genera are 2-4 inches wide, while those of Brandegi are about half an inch to two inches wide. Whether E. elegans Franchesi and E. aculeata Brandegee are good species I am not prepared to say. But I know all the species of Washingtonia as heretofore recognized, and am satisfied that they are generically distinct from Erythea (Glaucothea).

The fruit of Erythea elegans Franchesi is acuminate below. The fruit of all the rest is globose. The fruits of armata and Brandegei are about half an inch long. Those of edulis and aculeata are an inch long Leaves of edulis are not spinose, those of aculeata are spinose.

The flowers of Erythea armata are greenish-white. Calyx about 1 mm. long with the nearly round lobes very concave and lacerate on the margins and separate middle. Just below the tips of the calyx the white corolla lobes flare about 45 degrees and are deltoid-ovate and 2 mm. long and acute, the lobes seem united near the base within calyx and corolla is a cup formed by the united filaments which are scale-like and united half way up or almost to the tip and adnate below to the corolla. The elliptical anthers are nearly ½ mm. long and versatile and on a minute but evident pedicel. The ovary is 3-lobed and with stigmas about sessile.

The flowers of armata are in long and greenish panicles, the perianth at length white and 2 mm. long and parts triangular-ovate. The 6 stemens form a cup around the ovary, with the greatly expanded filaments flat and deltoid and with the oval anthers about 1-10 mm. long sitting on the tip. The cup is either complete by the union of the filaments almost to the tip, or by the parts being slightly united at base. The flowers are strongly odorous, smelling resinous, the flowers appear cup-like and rather open. At Claremont there seem to be two flowering seasons, one in May and the other in August. The fruit of edulis when ripe is black and juicy and smooth and fully an inch in diameter, globose or nearly so, or a little oblate, when less ripe is reddish-yellow The fruit never seems to be but 1-seeded. Inflorescence minutely hairy.

A character not clearly noted that separates the Ertheas from Washingtonia lies in the bracts of the inflorescence. In Erythea there is a relatively short bract at the base of each grape-like cluster which tightly hugs the rachis and is not prolonged into a leaf, and therefore is inconspicuous. The inflorescence of E. edulis is a uniform panicle 3-4 feet long, ovate to lanceolate in outline and on a short peduncle much shorter than the petioles. The general appearance of the panicle is that it is concealed among the leaves. The panicle of E. armata is a long raceme of grape-like clusters, and each cluster separate and rather distant from the next one. The main peduncle is nearly as long as the petioles, and so the panicle is exserted. The panicle of Brandegei is that of edulis.

In Washingtonia the inflorescence is about the same as in E. armata, but each cluster has the subtending bract elongated and as long or longer than the cluster. A foot or two long, and white and about 2 inches wide and like a corn leaf, and is always very conspicuous.

The fruit of armata is nearly ¾ inch wide, rather tan colored and with granular pulp, about 1-2 mm. thick, and seed somewhat oblately flattened, the pulp being like that of the cocoanut but horny, with the embryo on the flattened side, and with no milk. It is evident that oil could be extracted from the fruit. The amount of pubescence is very variable and uncertain. Perhaps the flowers of armata were better described as being perfect, as they always seem to be, but many plants do not produce seed. We have one tree at Claremont that is always sterile though flowering abundantly, near it is a tree that fruits copiously, but there is no difference in the appearance of the flowers except that the filaments of the sterile one are barely united. This follows the observed habit of Washingtonia Sonorae where there seem to be ten times as many staminate trees as fertile ones.

The floral characters of Washingtonia were not known at the time of the publication of the Botany of California by Watson. There seems to be a very great difference in the character of the flowers between Washingtonia and Erythea if the floral characters of E. Brandegei and aculeata are as in the other species. Standley in his Shrubs and Trees of Mexico does not seem to know anything about the two genera, attempting to separate the genera on the entire or split sheaths, a visionary character. While the floral characters he knows nothing about, he also says the flowers of Erythea armata are purple, when they are not. The most marked character in the genera is the anthers which in Erythea are oval and very short, tipping the greatly dilated filaments which are united below. The anthers of Washingtonia are linear and fully I mm. long, at least twice as long as in Erythea, and the filaments are subulate.

The seeds of Erythea are much flattened on the embryonic side and ½ to 1 inch wide and half as high and full of horny and oily pulp resembling the meat of the cocoanut but denser. The embryo is oblately spherical. These characters are taken from E. edulis and armata. The flowers are greenish-white and very small, not over 2-3 mm. long. The plants fruit copiously in cultivation. The pulp of E. edulis is 2-3 mm. thick on the outside of the bony shell and black and juicy but rather solid. The fruit of E. armata is nearly ¾ inch wide, reddish-yellow when mature, about half the size of E. edulis, with the outside pulp 2 mm. thick and granular and not juicy. The other seed characters the same in edulis except the size. The horny shell of the seeds is very hard. The fruits seem at first sight to be globose, but closer inspection reveals them much flattened on one side and irregular.

KEY TO SPECIES OF ERYTHEA AND WASHINGTONIA

Seeds not less than half an inch long, deeply excavated on one side. Flowers not over 4 mm. long, greenish-white, with petals but little exserted beyond the calyx, and filaments united below into a cup. Fruit almost spherical, or obypriform. Bracts short. Erythea.

Seeds not excavated on one side, less than half an inch long. Flowers about 1 cm. long, white, with petals linear and much exserted beyond the calyx and with tips reflexed. Filaments not united below into a cup. Inflorescence linear, of several grape-like clusters arranged racemosely. Peduncle elongated. Fruit not spherical. Bracts long. Washingtonia.

ERYTHEA

Key to Species

Inflorescence an open panicle and uniform throughout, on a short peduncle.

Fruit about an inch or more long, black, with pulp about 3-4 mm. thick, sweet and juicy, round. Leaves apple-green.

Petioles deciduous, unarmed. 1. E. edulis.

Petioles armed, persistent. 2. E. aculeata.

Fruit about an inch long, obypyramidal. Leaves glaucescent. 3. E elegans.

Fruit about half an inch long, round, reddish at maturity, with pulp about 2 mm. thick, and mostly granular. Leaves green or slightly glaucescent. Petioles armed and persistent. 4. E. Brandegei.

Inflorescence linear, of a series of grape-like clusters arranged racemosely on a long peduncle, the whole exserted beyond the leaves. Fruit about half an inch long, reddish at maturity and with pulp about 2 mm. thick and granular. Leaves glaucous. Petioles armed and persistent. 5. E. armata.

WASHINGTONIA WENDLAND

Inflorescent linear, of several grape-like clusters arranged racemosely on a long rachis which becomes a long peduncle below. Leaves green, with digitate rays, as in Erythea, with armed petioles. Bracts long, white and conspicuous. W. filifera.

Leaves with blade 3-5 feet long and mostly longer than the petioles, and in age reflexed and forming a compact and continuous and sightly sheath around the trunk, the individual leaves not separable as in the others. E. filifera var. robusta Parish.

Leaves with blade 2-3 feet long and shorter than the petioles, reflexed in age and forming an interrupted and unsightly sheath.

Leaves not split to the middle and tips not conspicuously drooping. W. filifera var. typica.

Leaves split to the middle into linear ribbons which droop and flutter in the wind. W. filifera var. Sonorae.

ALLIUM

Jepson's treatment of this genus in his manual shows all the marks of being done with a lick and a promise.

Allium validum Watson is named the Swamp Onion. Whoever gave it that name probably never saw it growing for it never grows in swamps, but along alpine and subalpine rivulets along bedrock where there is always running water.

Allium fimbriatum Watson. Jepson p. 218 gives the bulb coats of this species as having particularly distinct rectangular bulb-coat markings almost the same as in A. Parryi, and he adds two new varieties to it. One thing is certain about this species and that is that the markings are not rectangular and not distinct, and not in any way related to A. Parryi. The plant is very common on the Mojave desert and adjacent mountains on the east slope at low elevations. The most conspicuous character is that the flowers darken in drying and become very dark red. Another character is that most of the bulb coats are so thick that no markings are discernible at all, in fact no one knows as yet what they really are except by inference from the vegetative characters which are those of A. bisceptrum. A. bisceptrum produces bulblets distinct from the parent bulb, somewhat after the fashion of Fritillaria pudica, each bulblet however close it may be to the parent bulb seems distinct, but the main bulb at times may divide by splitting and forming a new bulb on one side below, though this is very rare. But there are copious bulblets formed around the lower edge of the parent bulb, and which often are connected with it by runners an inch or more long, and these are white and with very thin and hyaline coats. Allium fimbriatum however rarely forms new bulbs, and then by buds pushed out from the outer and lower edge downward, but the bulb scales are conspicuously different, being very thick and opaque and red, and bulbs nearly globose while those of bisceptrum are inclined to be ovate. The leaves of fimbriatum are always single, while they are two or more in bisceptrum. The leaves of both species are thick and fleshy and triquetrous.

Jepson keeps up Allium campanulatum on the flimsiest of grounds. So far I have been unable to find any tenable characters, to distinguish it from bisceptrum.

Allium haematochiton Watson. Smiley in his Flora of the Sierra Nevada page 138 throws doubt on the accuracy of my statement that this species grows at Soda Springs (Jones, Allium P. 8). I have reexamined the specimens on which this statement is based, and am inclined to believe that Smiley is right, and that this species is found only in the Tropical life zone, and that my specimens belong to another species, A. validum?

Allium Piersonii Jepson is antedated by A. monticola Davidson Neither writer seems to ever have seen the specimens of this specie growing. It has been persistently referred to the falcifolitum group becaus of its great and hooked flat leaf, overtopping the stems. But the metho

of propagation is entirely different, and is that of A. bisceptrum, while the bulb coats rarely show the tortuous markings of bisceptrum.

Allium decipiens Jones is yet to be segregated from the bisceptrum group. There are two good bulbs in the type whose markings may keep the species up, but the general aspect of the plant is too near bisceptrum.

Allium amplectens Torr. Jepson confuses with A. serratum Watson, which is the same as A. peninsulare Lemmon. There is no mistaking Watson's description of A. serratum.

Allium acuminatum Hook. Jepson never seems to have noticed the peculiar markings of this species which can be instantly separated from all other species.

I am not in a position to criticise the species of Jepson, intactum, anserinum, and Modocense, never having seen the types. But their validity is doubtful.

Allium monticola Davidson. This onion which has been found growing on San Antonio peak by various botanists. I have had an opportunity to study growing in its native habitat, and can give more definite information about it. I am convinced that its place is near to A. bisceptrum and campanulatum, and not at all with the falcifolium group, for the following reasons. That group all propagate by division of the mother bulb by splitting down the center, as well as by the seeds. They all grow in clayey situations mostly on bare knolls where there is a water seep in the spring. The crests where they exist at all are low and thick and not lacerate and inclined to be central instead of on the angles. They all have the wide onion-like leaves which greatly surpass the inflorescence and are falcate. A monticola does not propagate by division but by filiform underground runners as does A. bisceptrum, on the ends of which is at least one bulblet. These runners vary in length from a millimeter in length to four inches. Very frequently we find bulblets coming out at the angle where the bottom and side of the mother bulb come together and pointing downward, at other times the bulblets are remote from the mother. The length of the runner seems to be a matter of convenience of location among the slide where the plant grows. The plants always grow in talus, or sliding shingle, never in clayey situations, and generally singly and not in bunches as the other. It also grows at or near timber line where the winters are severe, and not in the Middle Temperate or lower life zones as do the others. Then the bulb coat markings seem to resemble the Falcifolium group because of meshes except the rectangular ones of the thin coats. But the difference is greater in that A. monticola has several to many thin coats interspersed between thick and rather rigid coats which seem to be papillose-pubescent to such an extent as to obscure the markings if there are any. Once in a while I seem to faintly discern minute crinkly markings of the bisceptrum group, but as yet am not certain that there are any such markings.

Another species that seems little known is A. lacunosum. This has the habit of most onions, growing on bare knolls where there is water seep in the spring, where there is some clay. The fact that it has two

filiform leaves separates it from fimbriatum and acuminatum, both of which have the thick and rigid bulb coats intermixed with thin ones, but have the solid meshes which are so characteristic of acuminatum and whose walls are raised forming pits in the coat, and which are very minutely sinuous. But there is a difference in these markings. Those of acuminatum are triple, the meshes rounded or nearly round and deeply pitted, so that they can be seen by the naked eye. Those of fimbriatum are small and oblong, coarse walls apparently simple and little raised but hard to make out, while the crests are fimbriate and very long. Both these species have acuminate and very red flowers, fully half an inch long. Those of lacunosum, the meshes, are oblong, evidently pitted and walls with a sharp ridge in the middle. The pods have entire crests on the angles extending toward the center. The flowers are about half the size of the others and mostly white or with pink stripes along the middle and thin. There are other species with the same habit as the acuminatum group but the meshes are serrate as in serratum, peninsulare, etc. The color of the bulbs is almost always red as are those of A. fimbriatum.

Jepson in his Manual of the Flora of California adds a synonym for A. monticola in A. Piersonii, a needless synonym.

Allium serratum Watson. Jepson is again in error on page 220 of his Manual where he calls A. serratum A. peninsulare, and applies the name serratum to A. amplectens. A casual reference to the Botany of California pp. 148-9 and to Bot. King 487 t. 37 f. 4-5 shows conclusively that Watson's type of A. serratum was the long and acuminate flowered form which had been referred to A. acuminatum and which is plainly A. peninsulare of Lemmon. After the description Watson refers to A. amplectens as probably a young state, but in this he was in error. A amplectens of Torrey was well described by Kellogg, and this inappropriate name amplectens was discarded by Watson who adopted attenuifolium in its place, but strict priority requires the retention of amplectens. The plants of this group are at once identifiable by the inflated flowers and wide perianth, and seem to include A. Sanbornii which differs in having the thick bulb coats with innumerable fine vertical lines and minute vertically oblong meshes. A. Sanbornii may be only an aberrant form of the other, for at times the zigzag markings of amplectens may be wanting. One can see no reason for the absence of these markings, but it is a fact just the same.

Jepson proposes several new names for onions in his Manual, and of these I cannot speak at present except to say that it is quite unlikely that there can be so many undescribed species.

ALLIUM INYONIS

The bulbs are single, round, ovate, erect, ½ inch wide and an inch long, normally dark-purple, at least within, of thick and papillose and opaque scales alternating with thinner and papery ones which are also papillose and translucent, but showing no well defined meshes though

here are very faint lines running nearly vertically with slight waves in hem and with cross lines as if walls of the cells, which do not go directly across, but the general outline of these so-called cells is oblong. Toward the tips of some of the thinner scales there are very many small and oblong cells appearing quite regular and vertically-oblong. A. atrorubens on the contrary has thin bulb scales, all of them, and the meshes are well defined, and with relatively straight walls, and no tendency toward kinks. It is a common plant of north central Nevada to the Utah line, and normally the bulbs are nearly white, and flowers normally almost black-purple, and the bulbets are conspicuously elliptical and elongated, while those of Inyonis are either spherical or ovate and not elongated. The floral segments of Inyonis are linear-lanceolate and acuminate and about ½ inch long, and fully as long as the slender pedicels, white and with a purple strip down the center rib, erect and not spreading nor recurved. Crests central, linear and mostly entire and erect and from ½ mm. long, and slender. Bracts mostly 3. and broadly ovate-triangular. Flowers 20-30. Seeds black, angular and appearing papillose or cellular., and nearly 2 mm. long. No doubt this plant is an ally to A. fimbriatum, and not allied to atrorubens, as is shown by the peculiar bulb coats. It is still a problem to find well marked distinctions between Allium fimbriatum and cristatum. Allium fimbriatum seems to have the crests arise from the angles of the ovary and not the style, but the free parts or tips are close to the style. Our southern botanists are unable to separate A. Parishii from A. fimbriatum.

Allium fibrillum Jones. This appears to be common under coniferae west of Currie's Nevada on the mountains adjoining Ruby valley. The bulbs are elliptical, and split below or produce long underground root stocks bearing one or more bulblets, often having a small bulblet arise from the lower edge of the main bulb. The stems are filiform and with single filiform leaves 4-6 inches long and 1 mm. wide which generally curl toward the tip. The bulb-coats are yellowish, flaky and thin, appearing as if rugose. The stem has but one leaf, but there are others at the base, so that mature plants may seem to have two or more leaves.

Allium praecox Brandegee? Norco, on the northwest slope of hill, in the brush, in sandy gravel. March 20, 1929. Plants single mostly, apparently not propagating by division, about 1 1.5 feet high, erect and strict. Leaves lenticular in cross-section and often half an inch wide, soft flabby, erect and tapering to tip and a little shorter than the scape. Bulb depressed-globose, not over an inch wide, of very thin and gray scales with the markings of peninsulare. Flowers 10-15, normally white within, and on the outside purple-veined below, and usually with a rather broad stripe down the middle which fills the whole segment below. Segments firm but not rigid, oblong-ovate, acutish, opening so as to make the flower campanulate, about 6 mm. long, all entire, a half longer than the stamens. Crests conspicuous and spongy and toothed, rather wider than the ovary, purple and fully 1 mm. high. Bracts of the inflorescence

ovate-acuminate, about an inch l ng, 2. Pedicels rather stout, 1 1.5 inches long and spreading. The onion of southern California are in a state of chaos. When my revision was printed I had not had a chance to study the California forms, and apparently did not clarify them properly. The bulb coat markings of this species would place it among the specialized group represented by A. bisceptrum, and in that case the roots should propagate by budding from the lower edge, or by offshoots ending in bulblets there. So far as I have seen there is nothing to indicate what is the method of propagation, but the species is a remarkably well defined one, and fully distinct from the flabby ones like attenuifolium. Then the leaf character is that of bisceptrum.

Allium Inyonis Jones. Abrams in his flora of the Pacific Coast p. 589 makes this the same as A. atrorubens Watson, in which he is mistaken. The relationship is closest to A. bisceptrum and fimbriatum. The flowers are not the lurid ones of A. atrorubens. I now have rather abundant material from near the type locality, just east of the "Summit" of Owen's valley. It has the habit of A. fimbriatum, growing in loose gravel on the edge of the juniper zone and on comparatively level benches at about 5000 feet alt. along with Cogswellia Parishi Crepis occidentalis, Cowania, Juniperus Utahensis, etc. The stems are about 4 inches high, and the thick and wide leaves are single and coiled at tip and flattened and glaucous and surpassing the stems a little. The stems are 2-4 mm. thick and erect and stout. The roots are about 4 inches below the surface.

Hesperocallis undulata. This desert lily abounds on sandy flats free from alkali in the Imperial valley. The stems shoot up straight for a foot or two at first, and then often but not always bend over and rest on the ground. The leaves are always flat on the ground and often three feet long. The stems go down about a foot in the sand and terminate in an ovate bulb heavily coated with coarse and fibrous sheaths. The bulbs of well developed plant are about 3 inches wide and six inches long and erect. The stems are very fragile and slender near the surface and break off readily, though higher up are often an inch thick. At flowering time there seem to be mostly a special set of roots to furnish moisture. These are about four inches long, half an inch thick and an inch wide, resembling a slice of citron prepared for eating. I have seen a dozen of these on one root, or bulb.

In Cont. Herb. 1 278, in describing Festuca Jonesii Vasey refer the type locality to southern Utah, but the plant was gathered in City Creek Canon, Salt Lake City, Utah.

Yucca brevifolia Eng. If one follows the hair-splitting of Treleas (and I do not) he would unhesitatingly put this species in the propose genus Clistoyucca because of the peculiar perianth and the nauseatin odor of the flowers. No other Yucca has such thickened petals at th tip nor the odor, but in all other rsepects it is a good Yucca. Y. valid

f Brandegee has much the same habit, and doubtless is a form of Y. australis, which belongs to th macrocarpa group with edible pods.

Yucca Whipplei Torrey. I fail to see any good reason for relegating his species to a separate genus. It is in every respect a good Yucca, and most magnificent one of them all. The typical form of the species was got at San Pasqual, which is east of Escondido, California. I have visited that locality and studied the plant there. Unfortunately the form there is intermediate between the two most abundant forms in California, both of which would ordinarily receive specific names. In order to keep these forms separate I propose the following names, based on habit:

Yucca Whipplei var. Parishii. n. var. Plants with biennial habit, that is dying as soon as flowering and not stoloniferous. Leaves flat and widest in the middle, often an inch wide and 2 feet long, peduncles often 10 feet long and 4 inches thick, with a flower cluster 10 feet long in addition. Pods erect, rather oblong. This is the common form at low elevations on the Pacific slope, seldom if ever found on the desert side. Y. graminifolia Wood is also an intermediate form which occurs at times on the lower hills.

Yucca Whipplei var. caespitosa n. var. Plants conspicuously caespitose with many crowns. Leaves triquetrous and long-linear, rarely over ¾ inch wide. Peduncles a few feet long, the flower cluster about as long, whole rarely 6 feet long. This is the common desert form and runs over the crest of the ridges at Cajon pass, extending from near Owen's valley southward into Mexico. The flowers of all the forms are normally white, but occasionally are purple-tinged. The species when in flower is alive with the little pronuba moths. This plant should be the state flower of California.

Yucca brevifolia Eng. Y. arborescens (Torr.) Trelease. This species shows a variation from all other Yuccas in the thickened petals and in the very disagreeable odor of the flowers. The flower cluster is a very dense ovate or oval mass a foot or two long and sessile among the leaves, and greenish-white in color. The heads bloom mostly in April at 3,000 to 4,000 feet altitude. The flowers are so congested that they appear erect and they never seem to open more than enough to let insects in. The bracts are small, white, and hyaline and do not show till the flowers fall. The outer perianth parts, 3, are broadly linear, fleshy and blunt and thickened at the tip to 2-4 mm. thick. The inner parts are elliptical and also thickened. The leaves are widest at base and very rigid and bluish, tapering to the very sharp tip. The trees are usually 15-20 feet high and sometimes 3 feet in diameter. The leaves fall off after a few years and leave swabs of them on the ends of the stems.

Yucca australis var. valida (Brandegee) Y. valida Brandegee. The status of this species is still in doubt. To all appearances it is only a form of Y. australis, growing in more desert places. It has very little relationship to Y. brevifolia, whose pods are not fleshy but dry and cartilaginous when ripe. It was my good fortune to get ripe pods of the common Yucca of the Cape region near Todos Santos, which is Y. australis and can be separated at once from Y. baccata by the flat, short,

and flexible leaves narrowed below and by the very slender and thread-like filaments on the margin, contrasting strikingly from the coarse threads of baccata. The pods are oblong and not pear-shaped and conspicuously fleshy pulpy with sweet and edible pulp nearly half an inch thick. The pods are pendent. The flower cluster is scarcely peduncled. Flowers not seen. The leaves of both species are bluish, and not apple-green as in Mohavensis. This tree has the same habit of growth as Y. brevifolia and often is 20-30 feet high.

CALOCHORTUS SPLENDENS X PLUMMERAE

At the Burn Devore California. May 20, 1928. Plants about 2 feet high, usually a half higher than C. splendens, and usually with strap-shaped root leaves as in Plummerae. Flowers vary from the size of splendens to a half larger, bright pink-purple as in splendens. Glands absent, replaced by a purple smooth spot. Lower half of petal long-white-hairy within, as in splendens, and not yellow as in Plummarae. The whole appearance of the plant is that of a robust C. splendens with strap-shaped leaves, but has onion-like leaves. At first this seemed a valid species, but further search showed intergrades with small glands. S. Plummerae comes into bloom just before C. splendens goes out, and grows in the same locality with C. splendens.

Washingtonia filifera. An examination of the flowers of this species in the probable type locality shows that the perianth is made up of two distinct sets of 3 each, the outer set being cordate or very broadly ovate, and barely 1 mm. long and erect. The inner set has triangular parts which are acute and closely reflexed, white. The stamens have another about 1 mm. long and linear and versatile, and brownish. The pistil seems abortive though present. No female flowers were found, and no fertile flowers either. This accords with my observations of the var. Sonorae, where the flowers are often dioecious or monoecious. But I have not seen fertile flowers so far.

Erythea edulis. The flowers of this species are greenish white. The outer perianth members are as in Washingtonia. The inner ones are erect, cordate to broadly ovate and rather cup-shaped, and about 2 mm. long in the fertile flowers. The stamens seem abortive though present, the anther being very small and oval, not ½ mm. long, but the plants fruit copiously without other staminate flowers being present.

Erythea armata. This plant is growing in the campus of the college is clearly polygamous. Inflorescence linear, long-peduncled, 4-6 feet long and drooping, with twice as slender branches as in E. edulis. Flowers sessile as in edulis, but whiter, 3 mm. long. Calyx forming a cup-like area, nearly round and not hyaline and pointless, 1 mm. long, felted-hairy. Corolla lobes spreading 2 mm. long, trangular-deftoid and acute, barely united below. Stamens 6 with the filaments united into a cup nearly to the tip and rhomboidal, and with the anthers more stalked than in edulis, and yellowish and elliptical, fragrant, about half as long as the corolla, which is 2 mm. long. Young fruit felted white-hairy. Flowers appar-

ently perfect, but in some trees the anthers seem aborted at least in part. Stigma nearly sessile. The flowers of edulis are much greener and more numerous, and are arranged in a uniform panicle, while those of armata are in an interrupted panicle, like a string of clusters of grapes.

Erythea Brandegei. In Zoe 5 189 Brandegee says of Erythea Brandegei that it "grows abundantly in the mountains of the Cape region." In this I think he is in error, having confused Washingtonia Sonorae with it. There is nothing to distinguish this species from Washintonia but the inflorescence, and Washingtonia sometimes has smooth and leafless trunks growing below, and occasionally even close to the growing leaves, and in the mountains the trunks are slender and would wave in the wind. I studied the palms in the Laguna mountains up to 3,500 feet altitude and saw no Erytheas, though Sonorae was common in the canons and on the slopes among the live oaks, and had the pink wood characteristic of Sonorae. These plants were in flower and had the conspicuous white sheaths and inflorescence of Sonorae. Also on the way to La Paz from Miraflores, near San Bartolo, palms are common along the way, and all seem to be Sonorae. I saw but one little Erythea near there. Purpus in his description speaks of the flowers being 2½ mm. long and solitary, which are like those of E. armata, and not at all like those of Sonorae, which are nearly 1 cm. long.

Eriogonum deserticola Watson P.A.A. 26 125. This plant, described as a possible annual, is a shrub 3-6 feet high, with much the habit of the taller specimens of microthecum. It is hoary when young, and the densely woolly leaves are rather thick and rounded-oblong. The panicle is very open and with racemose branches and scattered flowers. It is one of the hosts of Ammobroma, the other being Coldenia.

On the way up to the palms in December, 1928, I saw a few bushes of Condalia lycoides the hosts of the same Phoradendron as grows on Prosopis and Acacia.

On the sand dunes west of Yuma we hunted for Ammobroma and found many of the dead stems, and traced them down to the connection with their hosts. The plant seems to be only partially parasitic on Eriogonum deserticola and Coldenia. The stems die down completely to the host after blooming. How the tiny seeds get to the host 3-4 feet away after germination, and how they can produce such stems is a wonder.

Eriogonum exaltatum n. sp. Vergin bridge below Bunkerville, Nevada growing in loose sand along the roadside. Plants erect 2-3 ft. high, annual. Leaves rather leathery, and thick, round, entire or slightly angled, white-woolly, 1-3 inches wide, on rather stout and wingless petioles as long or a little longer than the blades, all basal and clustered. Stems several to many from the crown, green and glaucous, forking repeatedly and terminating in long compound raceme whose final rays are 2-3 inches long and with about six involucres on the upper side, spaced half an inch apart and erect, on pedicels shorter than the body which is

smooth, and turbinate and about 3 mm. long, not angled and with rounded and very short lobes. Flowers white with greenish or purplish midrib raised below, about 2 mm. long, 2-6 to the involucre, with segments ablong, and cordate below and not spreading, smooth, much resembling those of microthecum. Lowest involucre in the forks. This plant is about as high as E. giganteum and alatum but with the habit of deflexum but more strict. Bracts all minute and smooth and much shorter than the pedicels. In 1894 I called the attention of the U. S. Geog. board to the misspelling of the name Vergin in official papers. The Vergin river was named after a man by the name of Vergin who once lived in that region, but who is now dead. But this Board seems disposed to perpetuate the false spelling, referring the name to Virgin, the Latin name for girl, which has no significance in this case.

Eschscholtzia Californica is said by K. Brandegee to be perennial in Zoe 1 281, because she "examined the roots." But I have grown the plant for years and never found the roots to persist over two years. They give every appearance of being perennial, I will admit, but they are not.

Eschscholtzia Californica. Very much work has been done on this genus by various people, most of whom knew nothing about the growing of the plants. Mrs. Brandegee, who had the best first hand information, from growing them expressed her emphatic opinion that most of the so-called species were confluent and not good species. Greene, on the contrary, who knew nothing about growing the species, went wild in the creation of new names. My own experience in the field in the last 50 years has convinced me that Mrs. Brandegee was nearer rnght than the others. Some years ago I began to grow E. Californica for the purpose of determining experimentally some of these theories. In Utah this species is almost always annual, but seems sufficiently distinct from Mexicana and minutiflora if grown from seeds of the true Californica. In California where I have grown it for three years it is always a biennical blooming the first year, and generally the seed starts in the previous fall. I have studied many thousands of forms in California and never have found it survive over the second winter after blooming, and never have found anyone who has ever seen a perennial Eschscholtzia. The assumption of Watson in the Syn. Flora to the contrary shows that he did not know the species as it grew in California. There is a species of Eschscholtzia that is a shrub which I think came from one of the islands next to Lower California and which Greene named.

Stellaria and Alsine. So far as position is concerned Alsine comes first being (Linnaeus Sp. P1) on p. 272, while Stellaria is on p. 422. Kew Index holds that Alsine media is Spergularia media, but the description of Alsine media says "Petals bifid" and so Kew Index is in error, for the species on which the genus stands must be a Stellaria.

Drymaria. It is evident on studying this genus that those who have described species in it know little about it. My study seems to show the seeds to have good characters, as well as the sepals and habit.

Robinson in Syn. Fl. p. 253 says under one star "Cauline leaves rather broadly ovate" but he should have added "or wider".

Silene multinervia Watson is evidently like a pediceled form of S. Gallica. The seeds are the same, but ribs of calyx 15 to 20. It seems nearest to S. conoidea, but seeds quite different, and more ribs to calyx. It looks like a hybrid between Gallica and conoidea. S. concolor Greene is S. Pringlei Wat.

S. simulans Greene is S. laciniata Cav.

Ranunculus Austinae Greene and ellipticus are glaberrimus.

Ranunculus distributed by Harvard as O. D. Allen's No. 97, and called Suksdorfi, has sharp lobes but is otherwise good Eschscholtzii Elmer's No. "669" distributed as Suksdorfii is the same. Synonyms of Eschscholtzii are eximius Greene, alpeophilus Nelson, Helleri Rydberg. Saxicola Rydberg, ocreatus Greene, Utahensis Rydb.

R. pedatifidus is vicinalis Greene.

R. glaberrimus is calthaeflours Greene, inamoenus Greene, and Populago.

R. alismaefolius is unguiculatus Greene.

R. adoneus is stenolobus Greene.

R. occidentalis is Earliae.

In Cont. Nat. Herb. I 278 Vasey in describing Festuca Jonesii refers the type locality to southern Utah, but the type was got by me in City Creek Canon Salt Lake City.

Dendromecon Harfordii (Kellogg). This plant is apparently a good species, due to the elliptical leaves and the smaller flowers. It becomes at times a shrub 10 feet high and four inches in diameter, with candelabrum-like branches, and is more strict than the type species. It is frequent on Santa Cruz island among the oaks on moist slopes.

NOTES ON DRABA

In going over this genus critically, the first thing one notices is the usual splitting done by ignorant closet botanists whose chief activity seem to be that of matching pennies. The genus has now been mussed up by Greene, Rydberg, Wooton & Standley, Nelson, and Tidestrom, to say nothing of the conservative but too florid treatment by Robinson in the Synoptical Flora of North America.

Taking the generic segregates, we find Robinson recognizing Greene's Athysanus, and reducing his Heterodraba, a very inconsistent proceeding for Heterodraba and Athysanus are congenreic. But Robinson does not accept Erophila which stands only on the bifid petals. Jepson reduced Draba eurycarpa to Parrya, which is probably the right thing to do. Jepson also reduces my Draba unilateralis to Athysanus, which is the proper thing to do if that genus is to be upheld, but he should have recognized Heterodraba since that antedates Athysanus. Greene puts his Draba graminea in Draba but it is not a Draba evidently. Braya graminea (Greene). About the only character that seems to have any weight as separating Athysanus from Draba is the reflexed pedicels. The char-

acter of the pod is draboid and not thysanocarpoid. The flowers are those of Draba, the cuneifolia section, while the habit is also. Draba verna has a decided tendency to drooping pedicels (at the tip). There is no other Draba except the so-called S. reflexa of Greene, but that species is doubtless a form of the aurea group with widely spreading pedicels which occasionally are a trifle reflexed.

Taking the species of Draba there seems to be endless confusion by the over-emphasis by the splitters of trivial characters used by Robinson. Taking the little Drabas (Drabella) with white flowers Robinson holds D. Caroliniana distinct from cuneifolia on the shortened floral rachis, a trivial character certainly, but in the mountains of Utah this falls down. Taking up the cuneifolia forms Robinson keeps up the indefensible D. Sonorae on the absence of peduncle and on the stellate pubescence. But it is a well known fact that the pubescence of this whole group is stellate, but one of the branches of the hairs is often prolonged, and this leads him to speak of the pods being hispid instead of stellate. Robinson admits D. brachycarpa into our flora on the strength of a specimen of Howell's from Roseberg, Oregon, but this doubtless is a form of cuneiforia.

Taking up the yellow flowered forms of Drabella, Robinson does not seem to know that the type of D. Mogollonica is surely a perennial as is shown by cotypes in the Pomona herbarium from material sent me by Greene. Robinson puts D. asperella Greene in his flora because of the filaments being enlarged below, and puts a question mark against the species as doubting if it properly belongs in Draba, evidently not knowing that D. Mogollonica has the same kind of filaments, and doubtless other species also have them. So far as my material goes, and it is extensive, there can be no real line drawn between D. nemorosa and stenoloba and montana.

Taking up the aurea group we find more confusion, for there seems no real distinction between the styliferous pods and the others, and this is complicated by the Mogollonica forms which seem to run into this group.

Taking up the glacialis forms we find Tidestrom publishing a Draba uncialis Rydberg, when Rydberg never published such a species. Rydberg published a D. uncinalis, but not a D. uncialis. Tidestrom shows no critical study of the genus, be just follows the bell-wethers who preceded him. Wooton & Standley, and Rydberg, of course, split to the last hair. Rydberg shows in his last flora the legitimate result of such a course. His book has 1100 pages, where his former Flora of Colorado, covering nearly the same area has only 450 pages, and if he were to get out another edition later his pages would have to be expanded proportionally. Draba as understood in America forms a well-marked group, sufficiently distinct from allied genera either by habit or structure so as to be readily and easily understood. There is not the puzzling intergradation that confuses the student of the Caulanthus-Thelypodium groups, but the species are widely variable, and cannot be kept within the narrow limits proposed for them by present authors.

Robinson describes the flowers of Draba corrugata as pale-yellow, when the petals are white, the sepals and stamens yellow, the latter exserted, a very important character not found in any other Draba.

The Draba Mogollonica group. In the Torrey Bulletin 10 125, Bot. Gaz. 5 157, Torr. Bull. 26 623, Pittonia 4 17 and on, Watson Proc. Am. Acad. 23 25 257 we have the various opinions of Greene, Heller, and Watson, on this group. Greene with his usual spleen against newcomers in systematic botany disposes of Heller as a bombastic upstart who spent his good money in going to the type localities of Fendler in New Mexico to collect duplicates of the hitherto unknown species of Fendler, and had the audacity to state that he collected duplicates of Fendler's Draba aurea var. stylosa in Fendler's type locality, not content with smirching Heller, Greene goes on to state some patent untruths in order to reinforce his claims that certain proposed species were distinct, as proposed by the infallible Greene. Heller in the Torr. Bull. 26 623 and on gives Greene a well deserved dressing down, and tries to show that the sheet containing the type of Draba aurea var. stylosa Fendler's No. 43 contains two new species and one new variety, which is going some, and which would seem to indicate that Fendler, one of the most acute of the old time collectors, was a slouch as a collector. Now it happens that I also collected near there in 1884, in the Sandias east of Albuquerque which are not far from Fendler's type locality, and in the same ecological area. My material collected on the 6th of September on the slopes among the deciduous oaks and shrubbery, corresponds well with Fendler's material as shown on his type sheet, and which both Greene and Heller try to separate into two species and one variety, on trivial characters. The presumption is that a collector of Fendler's ability would know whether the forms on that sheet represented varying forms of the same species, or were distinct. It sometimes happens that the best of collectors confuses species, but it does not often happen. My material shows conclusively that plants growing side by side, and presumably from the same seed are either simple or racemosely branched winter annuals with many leaves on the stems, which are either entire or conspicuously toothed. Plants a foot to a foot and half high, flowers light-yellow and large, and with stamens with filaments enlarged below. Pods broadly linear, oblique, twisted, about 1 cm. long, and a little longer than the slender pedicels. The style about 2 mm. long. There are simple stems in my material and stems racemosely branched from the base. The pods are somewhat hispid especially on the margins, but eventually would be smooth or nearly so, from the descriptions of Greene and Heller D. Helleleriana, D. patens, and D. Neomexicana are all form of the same species as is also D. asperella. The assumption of Greene that D. Helleriana is a subalpine species because of the locality in which it was got, which he assumed was in the high mountains was completely disproved by Heller. But it is a fact that forms of aurea with long styles are subalpine, and it is not possible to draw any line between aurea, streptocarpa and Mogollonica that will hold water. Greene's assumption that no forms of real aurea exist in this country still needs confirmation. Other synonyms are D. pinetorum, and spec-

tabilis, Greene. An extreme form which is subalpine is Baker's No. 58 from La Plata Co. Col. which has clasped stem leaves very broadly ovate and serrate, and perennial, and with filaments dilated downward Plants nearly smooth except for a minute puberulence and a few hairs. Watson is the only one who has called attention to the dilated filaments of D. asperella, but this character is not uncommon in the genus. Those of us who knew Greene most imtimately find it exceedingly difficult to treat his work with consideration since we are constantly coming up against his delibearate lies about well known things. With him anything went so long as he could make it stick, and as a bluffer he was a peach. He was a renegade clergyman , a sodomite socially, and a stench in the eyes of all decent people. The most charitable thing we could say of him was that he was insane.

Lyrocarpa Coulteri Hook. & Harv. Is ascribed to California on the type specimen, but never seems to have been collected since its discovery. It is common at Yaqui Well, 20 miles east of Julian. It is a shrubby based perennial, grows in the Tropical life zone, and now is found only in the bushes protected from stock which eat it greedily. It grows only on rocky slopes preferably southern exposures. The base of the stems is woody, as is the case with Stanleya pinnata, where it produces several branches racemosely. These straggle up, are slender and very brittle, reaching even three feet high, but normally are about 2 feet high, each branch terminates in a long raceme of brownish-purple flowers about I cm. long. The calyx is cylinderical and with the linear and concave sepals rather yellowish, and saccate below forming four conspicuous angles. The linear and concave petals have claws as long as the sepals. The blades are about as wide and spread at right angles to the sepals and twist over in one or two turns to the left forming a spiral but do not enlarge above. The color is a brownish-purple The stamens are straight, erect, and with long and linear anthers which about equal the sepals. The flat greenish pods vary greatly in length from twice as long as wide to four times as long as wide, sometimes being an inch and a half long. The plant grows on the slopes at the Well, but always protected by the brush, and usually only the long racemes project beyond the brush. It does not grow under mesquite or large brush where most of the annuals abound. I have seen it nowwhere else. In this vicinity the Agave desserti abounds, also Mammillaria phellosperma.

Examination of herbarium material shows that Orcutt collected this species probably at the same place, though it is credited to Borrego Spring, but it does not grow at the spring. But he must have gone past Yaqui Well to get to Borrego spring. An examination of the route of Coulter shows that in all probability Coulter went from Pala California along the old route to the Colorado river which went through Julian and down the slope to San Felipe, and then across the valley to Sentence canon and down it to Yaqui Well. From there to Borrego spring and thence probably to Kane spring following the present route to Yuma. In this case Yaqui Well must be the type locality of Lyrocarpa. What its range is north and south is still unknown.

Greggia. Robinson, Gray and Watson in the Syn. flora p. 102 No. 30 put Greggia along with the angular-podded genera such as Erysimum, Tropidocarpum, Sisymbrium, etc., in an anomalous group by itself, where it is entirely out of place. In the early years Gray evidently considered the plant to belong with Synthlipsis, Lyrocarpa and others with which it more readily groups itself. The soft and broad and stellate-pubescent leaves belong rather with the Dithyrea-Lyrocarpa group rather than with the Sisymbrium-Erysimum group with their pick-shaped hairs. The raised and rib-like septum in the middle of the greatly obcompressed pods is that of Lyrocarpa and Dithyrea.

Then the habitat is Tropical like that of the first two genera. The petals are aberrant in being so broad, though suggesting Lyrocarpa Xanti. In the Genera Syphanogamarum Torre and Harms follow the Synoptical Flora and add nothing new to the systematic position, putting Greggia next to Arabis and Erysimum, with which it is not at all related. That the pods are related to Synthlipsis is evident, and closely related too. An inspection of Gray's figure in Pl. Wright Tab. 1 p. 9 shows that Gray had never seen a ripe pod of the genus when he founded it. Whether Synthlipsis is generically distinct is another matter. It would appear to be from the character of the valves, which would place it nearer Lyrocarpa. Then the lobing of the stigmas is the same as in the Synthlipsis group, that is, lobes over the valves.

Robinson states, p. 142, that Watson's G. linearifolia cannot be maintained on the character of short styles and narrow leaves and therefore reduces it to Coulter's var. angustifolia. My material of Greggia got at El Paso, Texas has styles 3-6 mm. long. Those of the var. are almost none.

Greggia continued. The mature pods of Greggia are conspicuously obcompressed and flat, 2-3 mm. wide, with the septum conspicuously raised as a ridge ¼ mm. high, but the valves are entirely without any sign of a keel or wing on the margins, at any point, the tip of the pods being truncate to retuse, at both ends. Wooten & Standley p. 270, under Nerisyrenia, a substitute for Greene's Parrasia attempt to keep up the species on the leaves, and ignore the stigmas, but Robinson's material seems to vitiate this character. They also speak of the pods being "Quadrangular" a character that does not exist. Toward the tip some of the mature pods are bisulcate, but the angles of the valves are rounded always. It is curious that Robinson should give the type localities of both species as "S. W. Texas" which is very far from the truth, El Paso is the type locality for linearifolia, while both reputed species abound there, which is the extreme western side of Texas, and on the northwestern corner. My material gathered from El Paso south into Coahuila is copious, but does not show any transition between the two species.

Physaria. There is too much inclination among such botanists as Rydberg and Nelson to jump at conclusions in treating Physaria and Thlaspi. Physaria cannot be well understood without access to mature pods, and these are not always obtainable, oftimes the pods are subject to arrested development from lack of moisture in the air, just as is so

common with the Umbelliferae. No weight can be put on the comparative size of P. didymocarpa for this reason.

Arabis juniperina n. sp. Allied to A. Parishii. Seeds in 2 rows, broadly winged. Pods smooth, ascending, a little arched, 3 mm. wide and 1.5-2 inches long, triangular-acute, with stigmas almost sessile, nerved at least to the middle, and nerve raised below. Pedicels .5-1.5 cm. long, stout, and hairy. Perennials from a woody crown which is covered with very many, thick spatulate-oblanceolate and slender-petioled and entire leaves about an inch long, which are densely covered with felted, white, much branched hairs which are almost stellate. Pubescence on the stems gradually thinner toward the tip, but scattered on the pedicels, the leaves not auricled, linear and sessile, gradually reduced above. Stems several, branched below, often a foot long, erect, many flowered racemosely. Flowers purple, about 5 mm. long. This low altitude plant grows among the junipers at Cactus Flat along with Arabis arcuata and Holboellii on mesa, and blooms in spring. It has the habit of A. platysperma, but does not grow in that life zone, and is conspicuously pubescent. Cactus Flat is above Cushenbury Spring.

Dithyrea Griffithsii, Wooten & Standley. The authors of this name do not seem to know that D. Californica has the same character they applied to their species. They did not even know the really good character is in the short pedicels, which alone can keep Californica and Wislizeni separate.

Godetia latifolia A. Nelson and Kennedy is Clarkia rhomboidea. One would hardly expect persons with much botanical experience to make such blunders. Nelson wonders why other botanists have not taken up this species of theirs. May be this is the reason.

Braya graminea (Greene). Draba graminea Greene. Perhaps I should give more prominence to this change of name than I have given in references above. The cotype of this species is in the Pomona college herbarium from the collection of Baker, made at the head of the Grand Mesa, near Gunnison, Colorado. The plant is clearly a Braya and not a Draba, and grows at high elevation in the alpine region, and with the caespitose habit, and very low.

Crossomataceas. Recent studies of this genus and of Paeonia lead me to the opinion that the genus Crossosoma and Paeonia are closely related and belong to the same family. Bentham and Hooker put Crossosoma in the Dilleniaceae. Engler creates the family Crossosomataceae for Crossosoma, but leaves Paeonia in the Ranunculaceae. Gray treats the two genera better by putting them in a subfamily, Paeoniae, which though in the wrong family is the better treatment by far. There is a general similarity in the two genera that is unmistakable, and which allies the two genera to the Ranunculaceae closer than to the Rosaceae where Engler puts Crossosomataceae.

Paeonia. Robinson in the Synoptical Flora p. 56 speaks of the disk of this genus being "many-lobed". This is not true at least in Paeonia Brownii. The disk is flat and thin, and on the outer edge is the row

of stamens at least 1 mm. from the margin. Then comes a more or less double row of warty processes, mostly deltoid in outline, vertically grooved and acute, and almost as wide as long and thick, and often more or less united below, with solid interior and corky, and 3-4 mm. high, yellowish, sitting on the disk and not a part of the edge, as though they were abortive ovaries, then come the two to four follicles placed on the disk just as the warts are. These warts vary from 7 to 14, and are very conspicuous after flowering. The stamens have anthers that are quadrangular before anthesis. When they open the cells open along the middle, leaving a ridge, and lie flat, back to back, making the opened anther appear flat and very thin. Bailey does not mention these facts in his Encyclopedia of Horticulture, nor does Pflanzenfamilien figure the genus. These notes are from fresh material from Claremont, California growing in the wild.

Astragalus ervoides Hooker & Arnot. This species has always been an enigma, for it has never been collected since its discovery by Dr. Sinclair between San Blas and Tepic, western Mexico, and published in the Botany Beechey p. 417. It would seem that in Dalea B. L. Robinson, Bot. Gaz. 1898 p. 443 has done botanists a real service in laying the bugaboo Parosela which the Brittonians have set up to displace Dalea L. He shows that in the Species Plantarum p. 764 Linnaeus publishes Dalea as a synonym of Psoralea Daleae, citing Hort. Cliff, 363 t. 22 as the place of publication. This then becomes a proper publication of the genus Dalea, and which antedates Parosela Cavanilles, making the change of many names of Dalea wholly unnecessary, as was done by Vail,

Astragalus crotalarioides Bth. Ivan Johnston, who has examined the type of this species abroad informs me that it is surely A. limatus Sheldon. This then takes another puzzle out of the genus.

Astragalus oocarpus. Recent botanizing has extended the range of this very rare species. The type locality was surely near Julian, where it is still found. I also found it in 1926 on the Warner lake Cuayamaca drainage under pines. In 1927 I also found it on the Rincon grade two miles below Henshaw dam, and at Palomar hotel on the Palomar, where it is rather abundant. Normally it is about 4 feet high and erect among bushes, branching a little toward the tip, and with a very narrow outline, flower-bearing toward the tip in short racemes of ochroleucous and small flowers which do not bloom till about August, long after A. Douglasii is out of flower. In less shrubby places the stems straggle over the ground after the fashion of A. Douglasii, and the pods often are purple tinged as in that species, but smaller and somewhat stiffer, that is less papery. But it is evidently not far removed in relationship from that species, being truly of the Inflati. It is good to know that the species is in no danger of extermination.

It is rather amusing to see Jepson (Man. 573) making A. leucolobus a variety of A. inflexus, and A. Panamintensis a variety of A. atratus. He evidently has never seen a specimen of A. Panamintensis. He also makes A. limatus a variety of A. Preussii, which it is not. His A.

agninus is A. aridus, and is out of place.

Astragalus. Macbride Cont. Gray Herb. 65 pp. 28-29 (1922) tries to make a few new combinations in this genus. This was before the appearance of my monograph. A. lancearius Gray I at first confused with A. episcopus. Some years later I was fortunate enough to find it growing abundantly on the San Rafeal Swell, Utah, and was enabled to give a complete description of it for the first time. Macbride's treatment of A. tenellus is fair. In A. campestris he makes a blunder in putting A. diversifolius as a variety of it while it is surely a form of A. junceus. He fails utterly to see the cosmopolitan character of A. campestris Macbride 27 and for this reason keeps up a number of form species, Garrettii, Carletonii, hylophilus, Rydbergii. He calls attention to Rydberg's ludicrous reduction of A. Coltoni Jones to A. episcoups. He attempts to keep up Gray's A. Gibbsii var, falciformis under Sheldon's substitute curvicarpus. But anyone familiar with the flora of western Nevada would not make any such blunder. A. Gibbsii occurs all over the region to the Dalles along the eastern base of the Sierras and eastward along the Columbia as far as Huntington. That there are intergrades abundant is evident. Macbride shows his ignorance by saying that A. Gibbsii grows only near the type locality. It is the opinion of the writer that Macbride is too wont to jump in where his information is not enough to float him.

Astragalus bicristatus. It never was my good fortune to study critically this species growing till this year (1924). That the plant belongs with the tetrapterus group is evident, but it simulates A. Casei very much in many ways. The cross-section is the same, an oblate-oval, and when fresh could easily be mistaken for that species, as there is no sign of the winged sutures then, but on drying the woody nature of the sutures makes them raised ridges or wings when the cellular pulp dries. The pods taper at both ends into long and acuminate beaks and stipes. The flowers are normally white, though often tinged with purple, while the flowers of Casei are decidedly purple. The habitat is the same, gravelly slopes in pine forests, and along with A. Douglasii, Lower Temperate life zone. The general habit is the same. Leaves about the same, plants growing in tufts.

Johnston in his treatment of Plagiobothrys Jonesii Gray makes altogether too much fuss over a casual remark of mine about its being an Amsinckia in all but certain characters. I had no intention of having my remark taken critically, it was intended simply to indicate superficial resemblance only. Just how much faith we are to place in the generic characters of Amsinckia I am not discussing, but I think too much is made of morphology in systematic bontany, and the resulting hairsplitting gets us nowhere. To me the dimorphism in the barages is conspicuous everywhere, particularly of style of stamens, and to have anyone go and use this as a means of separating vegetable forms seems ridiculous. No one can actually say whether it is wrong or right till the plants are grown from seeds and the dimorphism actually proved. But the ecological disposition of the so-called species is very suspicious (ecologically).

Leonard in his revision of Scutellaria, p. 732, under S. antirrhinoides quotes specimens of mine from Prattville, Cal., "in 1879." I never was in Prattville till 1897, and only once then. So the reference is wrong. This doubtless is a clerical error, somewhat different from Payson' error in quoting a specimen of Thelypondium of mine from Mammoth Hot Springs Wyoming, a place that I never was in in my life. I collected often at Mammoth, Utah, 79 miles west of south from Salt Lake City, but the "Jones" he mentions must have been W. W. Jones, no relation of mine.

NOTES ON CULTIVATED COSMOS.

About 1920 I began to grow Double Cosmos for the purpose of creating a new strain. That year among several hundred plants I had two half-double ones and one with flowers all double and the internal ones as long as the outer ones. They bloomed so late that no mature seed was obtainable at Salt Lake before a heavy snowfall followed by a hard freeze killed all, the seed I did save did not grow.

In the spring of 1924 I bought of Fraser at Pasadena a packet of guaranteed seed, 90% pure double. Out of this I got about 10 half double ones and two all double ones which are now in full bloom, Oct. 16, 1924. Among these are certain sports with no rays at all, also proliferous heads which I will describe. The outer involucre has 8 linear-triangular bracts about ¾ inch long, united below into a flat disk 1 cm. wide. Just inside of this are 8 inner bracts which are not so green as the others, more hyaline, short-oblong and with triangular tip, and about 1 cm. long. These subtend the rays. The rays have stalks from 1 to 2 cm. long which are flattened a little toward the scales but are green and petiole-like. Some of these have two bracts near the base, others have knot-like projects a little below the flower as if rudiments of scales. There is no sign of ovary on the rays. At the top of the ray-petiole is the flat blade which does not differ from the normal one. From the base of this arises another similar short stalk about 6 cm. long which is green and bears a head of raylessflowers. Occasionally there is a ligule-like white bract corresponding to a corolla and 6 cm. long, but mostly there is nothing to represent the corolla. The heads mostly have less bracts but shaped alike. These doubtless will bear fruit. The disk floers are similar but stalks 2-5 cm. long, surmounted by a bell shaped corolla about 4 mm. long and white, this is subtended by 2 ligulate white bracts longer than the corolla. The stamens seem to be free and with rather long filaments. Then comes a head like the rays head but not oblately flattened as they are, and like them without rays.

Peucephyllum Schottii Gray. This poor shrub has been about as badly mishandled as anything could be. It was at first found by Schott in Sonora and the genus erected by Gray in the Mexican Boundary Rep. page 74. Then in his notes preliminary to the Synoptical Flora (Cont. 9 p. 206), he makes the egregious blunder of putting it in Psathyrotes, a genus to which it is not at all related. Then in the Syn. Fl. itself he

keeps it next to Psathyrotes. Then in 1897 I got the plant in the Death Valley region and after strenuous trying to get it identified at Harvard without results. I named it Inyonia dysodioides. A few years later that most acute botanist Mrs. Brandegee called my attention to its similarity to Peucephyllum Schottii. We then compared it and found it the same thing. I seem to have been the first person who ever studied it in the field and published the results,whichcleared up its relationship. To me the plant belonged nearest to Dysodia, but has the general habit of an Aplopappus, which after the fashion of Lepidospartum which to me is a good Tetradymia but with the habit of a Bigelovia. These anomalies in habit and structure weaken the already too badly strained classification of genera on physiological characters. There may be no better one in sight just now, but there should be one somewhere.

Venegasia carpesioides Gray. The involucre is distinctly Coreopsoid. There is an outer series of green bracts at the base of the head, and immediately above it a series of rather hyaline bracts in one whorl forming a kind of cup in which the flowers lie. The corolla tube is densely hairy with flattened and about six-celled white hairs spreading irregularly, and appearing as if glandular at tip. At the very base of the tube there is a ring of similar hairs closely reflexed as if a kind of pappus but not larger than the other hairs. The akenes are about 10-angled, and on the angles is a line of interrupted white cells as if the beginning of wings. These notes are taken fresh from material gathered by me on Santa Cruz islands, March, 1929.

This plant is not well characterized by Gray either in the Botany of California Vol. 1 p. 372, or in the Synoptical Flora Vol 1 pt. 2 p. 317. In addition some errors occur in the characters given. The general appearance of the plant is that of Silphium or Wycthia, but the texture of the leaves is soft and thin though the plants are a yard high, with the stems very leafy. Plants nearly smooth throughout and erect, branching above. The peduncles terminal and the flowers therefore single or cymose, and yellow even to the disk flowers and inclined to be overtopped by the leaves. The under side of the leaves has scattered over the surface and on the ribs rudimentary hairs which Gray erroneously calls "resinous atoms." He also calls the pubescence on the base of corolla tube "glandular-bearded," which it is not. The leaves are alternate, slender-petioled, ovate-acuminate, soft, almost smooth, palmately veined, 3-4 inches long and with ribs conspicuously raised below. Heads ¾ inch high, about 2 inches wide, on a peduncle about 3 inches long, which terminates in one to few lanceolate bracts close to the heads, which pass, on the angles of the heads, into 1-3 broadly lanceolate spreading, and twisted or variously distorted and eared and acute bracts ¾ inch long, which are green and erect. Then next the flowers is a single series of close-pressed, erect,cordate-ovate and rounded bracts about 1 cm. long by ¾ cm. wide, which are conspicuously eared below, smooth, green but tending to become hyaline above. The heads are truncate below and sharply angled at the insertion of the outer bracts and 1 cm. wide. The

receptacle is about flat and favose with circular pits where the flowers arise. There is no chaff or other processes on the receptacle and for this reason the genus is thrown into the Helenieae rather than with the sunflowers. The flowers are 50-100 and closely packed. Rays 15-20 and in a single series, pistillate and fertile and nearly linear and about an inch long, 3-5-nerved, obtuse, concave, with lower part tubular and 3 mm. long and densely pubescent with short flat jointed and oblong spreading hairs ½ mm. long, the pubescence inclined to spread a little upward along the ray. Stigmas club-shaped and blunt. Akenes cylindrical, finely striate, about 4 mm long and 1 mm. thick, black, truncate at the tip and without pappus, with scattered atomiferous hairs. Disk flowers yellow, about 1 cm. long, with the same pubescence on tube and with the same akenes which are oblong. One would think that the pubescence is glandular but I fail to find any glands. This is from fresh material recently gathered near Santa Monica. The plants have the same habit as Silphium perfoliatum and grow among the brush in tufts along with Helianthus Californicus Rhus virens, and intergrifolius, Salvia mellifera, Stachys Californica, Platanus, etc. The flowers are much inclined to be in imperfect heads, and heads always surrounded by the leaves. This is a shrub 4-10 feet high.

Introduction to the Genus Haplopappus by Harvey M. Hall pp. 32. The most striking thing about this brochure is the assumption that the data there given are new to science. Even a cursory examination of the work of a score of systematic botanists from the time of Nuttall to the present should have given Hall the data to accord credit to men who worked in that line before Hall was born. Perhaps Hall has no intention of assuming to himself the credit for the principles he announces, but if he does not he should have referred them to men who used them long before he was a botanist. If on the other hand he does not intend to assume credit for them then why does he publish them at this late date? I myself have used them for over forty years in my study of the ecology of the Great Basin, in which I spent my life since 1878 One reason why we incline to question his motive in the matter is that he is under the direction of Clements, whose assumption of great superiority over others is chronic.

Leptosyne gigantea. It is hardly likely that this can be distinct from L. maritima. It abounds on Santa Cruz island hanging from the cliffs near the sea. At times it becomes ten feet high and with a trunk 4 inches thick, but not really woody, for the ax will cut like a knife through the whole trunk at a stroke, quite different from the trunk of Alvordia glomerata which is woody like the allied genera, such as Aplopappus. The branches of the trunk come out in a candelabrum-like way and are few, and with the big swabs of leaves on the ends, being leafless elsewhere. As to merging the genus in Coreopsis I incline to think it is not justified. So far as this species is concerned the corolla is peculiar not only in having the bulb at the base variously developed but in having the lower two thirds of the corolla green and finely striate and rigid, then

it terminates abruptly in a yellow and very thin tube 1-2 mm. long with the lobes on the end. The green part is conspicuously different from the rest. At the point of change there are a few gland-tipped hairs, 1-3 cells long. The seeds are 10-striate. The ray flowers show the same tendency of the base of the corolla. The seeds are without any pappus, or rudiments of any, flat, and with only rudimentary wings.

Tuckermannia maritima Nutt. Trans. Am. Phil. Soc. 7 363. This is the original name for Leptosyne maritima. The characters given for the flowers in the notes above I find are common in both species, and are generic if we adopt Tuckermannia. The floral character is not found in any species of Coreopsis or Leptosyne. In addition no other species of Leptosyne is perennial or shrubby if we put Coreocarpus as a separate genus as Blake does. To me Coreopsis as accepted by Gray is made up of too many and too diverse groups. Whether the other species of Leptosyne are rightfully put in Coreopsis is a question. They have the same floral character, which is a distinct cylindrical tube, a little firmer in texture than the corolla proper, and which ends mostly in a ring of hairs and the swelled upper part or true corolla which is strongly 5-nerved.

Tuckermannia gigantea (Leptosyne gigantea Kellogg Proc. Cal. Acad. 4 198). Whether this can be kept distinct from maritima is still a question. It is a well defined species and always a shrub so far as I have seen. The leaflets are filiform and elongated, mostly twice as long as those of maritima. Maritima never is a shrub so far as I can find.

THE PASSING BOTANISTS

The last few years have taken a heavy toll of the old botanists. It is less than 100 years since the real botanical work in the United States began. My own life has spanned over half of that period. When I was a boy the names of Nuttall, Fendler, Wislizenus, Parry, Bigelow, Thurber, Kellogg, Hall and Harbour, Torrey, Gray, Engelmann, Wm. Boott, Lesquereux, Bentham, Sir Joseph Hooker, Eaton were familiar to all botanists. Then came a host of government explorers connected with the transcontinental railroad surveys, James, Watson, Stansbury, Gunnison, Coulter, Brandegee, Wheeler, Rothrock, Porter, etc. The naming of their collections was done mostly by Gray, Engelmann, Boott, Eaton and Lesquereux.

Then in the seventies there began many private collectors in exploring the regions of the so-called wild west. Hall and Harbour and H. N. Patterson and Brandegee did Colorado. I began work in Colorado in 1878. Bessey's students did Nebraska. Kelsey did Montana near Helena, so did Rydburg. Leiberg worked in western Idaho, Cusick in Oregon, also Howell, Tweedy, and others. Greene in New Mexico, Lemmon in California. In the eighties I did Utah, Nevada, New Mexico, Arizona and western Texas and California.

It was during this time in the late seventies that John M. Coulter

started the Botanical Gazette, published at Crawfordsville, Indiana, which, with the Torrey Bulletin, was the main medium of publication. N. L. Britton was connected with the Bulletin, but W. R. Gerard was the responsible editor. Now the only men of the long list of workers in those days still living are Britton and myself. The rest have passed on. The last two to go were Rose and Coulter.

Coulter seems to have been the one who started the nefarious scheme of taking part of the credit for work he never did, and which went into disrepute with Scribner. Rose was his pupil, one of the best, and took up the Umbelliferae. Coulter's part in this publication was that of sitting once in a while with Rose while Rose explained the work he had done on the genera. Coulter's chief part in the deliberations was smoking rank cigars and stinking up the room with tobacco smoke. It was the same method which produced Coulter's Flora of Texas, but to date no one has ever claimed being the clerk who got it out. This was the way Coulter got his reputation for being a systematic botanist. As a teacher Coulter was a great success. No one but Bessey ever turned out so many good botanists as Coulter. As editor and maker of the Botanical Gazette Coulter deserved the greatest credit. He was first, last and all the time a physiological botanist and not a systematist.

MEXICO

My familiarity with Mexico began with a trip to Ensenada with Pringle, Parry and C. R. Orcutt, who went as driver, cook and camp roustabout, in April, 1882. We drove to Tia Juana hot spring, then through the Valley of Palms, and on over the low mountains by the inland route to Ensenada and back by the same route.

In the spring of 1892 I was sent on a geological expedition to Mexico, going by rail to El Paso, thence to Sierra Mojada, thence to Zacatecas, where I spent a month between there and Casualidad, which is some 40 miles or more to the east. Thence to Mexico City, where I did not botanize. Thence to Colima and Manzanillo on the Pacific coast by way of Guadalajara. From Guadalajara I went by stage to Zapotlan. Thence by saddle animals to Ferreria in the Tapalpa mountains and back, botanizing along the way. Thence by saddle on the camino real to Tonila on the southern slope of the volcano of Colima, thence to Pihuamo, a day's ride through the jungle to the south, and then back again to Tonila. Thence to Colima, which I made my headquarters for a month, going out into the adjoining mountains. Thence by the narrow gauge railroad to Manzanillo, where I stayed a few days and botanized. Thence I went back by rail to Gen. Martinas' ranch, at Armeria, where we took saddle horses out into the coffee plantation, and botanized a little. Thence back to Colima, where I took hired horses to take me to the top of the volcano of Colima, and then over and on to Guadalajara by way of Zapotlan, going back to Irapuato and Laredo, Texas, and then on to Iowa through Texas and Arkansas. I collected over 700 numbers of plants on this trip.

In the fall of 1903 I went to El Paso, and thence by rail to Colonia Dublan, which at that time was the end of the railroad. Thence by stage to Colonia Juarez, where I hired a wagon and drove overland to Chuichupa in the Sierra Madres, botanizing on the way, and there and in Guayanopa Canon on the western slope. I spent about a month in that region. The botanical report on this trip was my Contribution to Western Botany No. 14.

During the Christmas holidays in 1923, 1924, 1925 and 1927 I took auto trips to San Quentin bay, botanizing on the way, but in 1927 I did not go below Miss Hamilton's ranch, 22 miles north of San Quentin.

I distributed sets of my 1882 and 1893 plants. I have sent out no other Mexican sets since then till the ones referred to in this publication below. There were Nos. 22292 to 22834 inclusive in the collection of 1926. There were Nos. 22835 to 23567 in the 1927 collection, and Nos. 24001 to 24659 in the 1928 collection. The smaller number of species in the 1928 collection was due to my collecting some 25 specimens of a kind in that year, and therefore of making many more sets than I am accustomed to do. There were 183 numbers in the 1928 sets, 124 numbers in

the 1927 sets, and 275 in the 1926 sets. That is the first set in each year contained that number of specimens.

The first requisite in the study of a region is a good map. The Hydrographic Survey of the Government has a good coast line map. This map was copied by Brandegee and by Goldmann in their reports on Lower California, but no attempt was made to put in mountains or settlements not visited by them. A few years ago the National Geographic society put out a pretentious one, claiming that it was accurate, but it is a farce, the mountains have been sketched in by the map maker wihtout regard to fact. Therefore a person going to that region has to make the first trip blind. I have been down the entire coast on both sides except the region north of Santa Rosalia.

After a week's rest I began sorting out and labeling my collection, which took me till June. Then I bundled a complete set of all my plants into an auto and struck out for Berkeley to compare my material with that of the Brandegee herbarium there.

I spent five very busy weeks at Berkeley till I had determined the names of most of my species except the new ones. Then a return to Claremont and a systematic study of all the literature followed, which consumed the rest of the year. I had already spent much of three years in making out a complete list of all the plants known to exist in the entire region. The results of all this work are embodied in this report. custom officials did not bother me nor ask any questions, nor did the steamer officers list my baggage as freight, as I had feared they would. The Americans on board, when they saw how well I got along, warned me that it would be different when I got to San Pedro. Well, at San Pedro I showed my papers and the inspectors passed me without question.

BOTANISTS IN MEXICO

The first botanizing of any moment was done about 100 years ago by men from British steamships that visited the coast. The expedition of Captain Beechy visited San Blas Nayarit (then called Tepic) and went as far inland as the city of Tepic, botanizing along the way. Mr. Lay was the botanist. His collection was reported on by Hooker and Arnot. Zantus was another botanist who spent considerable time at San Jose del Cabo about the same period, and at Santa Magdalena Bay. This report was by Bentham, called botany of the Sulphur. Not long after this Hartweg made large collections in Chihuahua and his plants were described in Plantae Hartweigianae. Dr. Coulter made a trip along our southern border a little later. Then the Mexican Boundary Survey in the fifties made a fine collection of specimens along our southern border and these were described in that report. About the same time Wright and Wislizenus made collections in northern Mexico. Also Thurber. These were described by Gray and Torrey. Various expeditions or visits were made by Californians along the Coast of Lower California by men more or less connected with the great gold rush in the late forties and fifties, and these specimens

found their way into the hands of Dr. Kellogg of San Francisco, who published them. Of late years Greene, Dr. Palmer, Orcutt, myself, Pringle, Purpus, Brandegee and various Government men have made extensive collections in Mexico, and the literature embodying the botanical results is rather extensive. By far the best botanist who ever worked in Mexico was Brandegee. Then came Pringle, a prince of collectors, who made the finest specimens, but whose work as an explorer was much inferior to that of Brandegee. Palmer's specimens were a disgrace to any botanist. Recently Standley has attempted to get together in a brochure on the Shrubs and Trees of Mexico all the scattered literature, and as a compilation is good. But the great mass of herbaceous plants is yet to be worked up.

To give even a list of the many men who have collected the flora of Mexico would be out of the question here, for I am interested only in the northern flora, that bordering on our southern limits.

Geologically the peninsula is an upthrust caused by pressure from the east, which caused a faulting of the formation from the San Jacinto range, California, to La Paz, Lower California, as is shown by the sharp escarpment rising abruptly out of the Gulf, in the form of interrupted precipices forming the san Pedro Martir range, which extends from Alamo nearly to Muleje, and then again rises into the long Sierra Giganta which extends some distance south of Loreto. This escarpment forms the backbone of the peninsula, and is triangular in cross section, with the western section sloping more gently toward the sea, and the crest reaching 8,000 feet altitude on the park-like summit of the San Pedro Martirs and 6,000 feet altitude in the Sierra Giganta. Toward the sea at the north there has been some crumpling of the sedimentaries into lower ranges parallel to the crests, and forming valleys between, but these valleys have been variously cut up by volcanic outbursts and flows, which become less frequent as you go south in the interior, and at length are entirely absent from Loreto to La Paz, leaving a vast plain rarely elevated over 1,000 feet above the sea. On the immediate sea coast on the west from north of San Quentin bay to the Cape other crumpling has thrown up low volcanic ranges of uplifted strata some of which form islands in the sea, such as Coronado, San Benito, Guadalupe, Cedros, Natividad, Santa Magdalena and Margarita islands, or scattered coast ranges of hills. The peculiar situation geographically, due to the lack of impinging currents and the air stagnation, has made the region south of the San Pedro Martirs very arid, and in consequence there has been a special adaptation of plants that has produced strange vegetable forms. The most peculiar being Idria columnaris, an adaptation of Fouquieria. Yucca valida, a form of Y. australis, certain Cactaceae, Veatchia Kelloggii, Ipomoea Jicama, and a few other species and genera with special features. This arid condition has led Brandegee and Goldman and Grinnell to a false conclusion as to life zones. They assuming the upper limits of the Tropical life zone as ending south of San Pedro Martirs, a conclusion wholly variant from the facts. The whole region examined by

me, from Nogales to Tepic, and from Santa Rosalia to the Cape, is all Tropical, except the tips of the San Pedro Martirs, which reach the Lower Temperate, and possibly the tips of the Laguna mountains. In very few places is the region of the live oaks reached, and this is still Tropical.

Along the escarpment on the western side of the Gulf, where the movement was greatest, certain blocks of sedimentary material have been lifted into islands, or volcanic outbursts adjacent have made islands, such as Ceralbo, Carmen, etc.

South of La Paz earth movements, caused by several pressure lines, have thrown up jumbled strata, forming a very rugged granite triangular area along the eastern coast, and which has in it various volcanic intrusions formed deposits of precious metals, and which rise to 3,000 to 4,000 feet altitude. This area is east and northeast of Triunfo (44 miles south of La Paz), and is very inaccessible. West and southwest of Triunfo the plains region south and west of La Paz gives way to the great Laguna range, whose eastern face is very precipitous, and runs nearly north and south some 75 miles to San Jose del Cabo, where it drops suddenly into the plain which borders the sea. The western side of this range is a great whaleback and less rugged though almost as steep, and is cut by box-like canons running down from its summit, and the base is about 20 miles east of Todos Santos. The Laguna range is crumpled by north and south forces into nine parallel ranges almost as high as the main range and about 10 miles long and which extend from the crest to the eastward like the flange of the letter L, though nine of them instead of one. They are very close together and form deep canons between and which are almost inaccessible. The altitude of the range is about 6,500 feet, and the upper half is covered with live oak and pine forests. There seem to be very few trails up the mountains for the reason that they have been utilized only as pastures for stock. One very difficult trail goes from Miraflores to a former lakelet or marsh called Laguna, and which gave the name to the range. The mountains have been visited by Brandegee and Goldman, but not at all thoroughly explored. Whether there is any Lower Temperate flora on the mountains is yet to be determined. So far as my examination went, the live oaks which abound on the upper stretches of the Tropical should give way to some Lower Temperate areas higher up. There are two classes of live oaks there, the true white oaks and the black oaks, but all are evergreen. This area has many open spaces with grass, and other herbaceous flora. Here and there grow Washingtonias among the oaks on the slopes, but usually they grow along water courses. It is in this region where the Erythea Brandegei grows, and which Brandegee says is very common there, but all the palms I saw were Washingtonias.

Brandegee speaks of the excessive rains in this region in the fall, and of the mosquitoes. But there were none there on my visit, and sleeping in the open was as comfortable as elsewhere in California. Goldman speaks of the great fear of the natives for the striped skunk, of which I heard nothing on my visit. We saw a cougar and a large rattlesnake,

and a few birds. They say deer are common. I also saw a blue racer about 10 feet long with highly colored coat. Large animals are scarce, but there are many small lizards.

NONTECHNICAL DISCUSSIONS OF TRIPS
FLORA OF THE GULF REGION

In the fall of 1926 certain parties approached Prof. Munz of Pomona College to undertake a study of the flora of Lower California. Since his time was taken up by class-room routine he could not do the work. I was then asked to do it, for the reason that I was the only one available. My interests in the region lie wholly in a study of the border region from Texas west to the sea. After looking the field over I saw that the exigencies of travel would require my going down from Nogales to Guaymas, and thence down to Santa Rosalia, Muleje, Loreto, and La Paz, and thence to Cape St. Lucas. From there the Pacific coast regions, Margarita and Magdalena, Cedros, San Benito, and Guadalupe islands could be reached by boat. In case it proved desirable to examine the east coast of the Gulf this could be done either by rail from Guaymas or Mazatlan. I therefore decided to make a preliminary trip and look over the situation to see if I would get in touch with enough flora of the border to make it worth while to me to explore it , and if necessary to do the flora of the Gulf region on both sides.

About the 20th of October I left Claremont and landed at Nogales, where I found that on October 10th a terrific rainfall of about 10 inches had swept the region from Magdalena to Guaymas and southward over the vast plain for hundreds of miles, inundating the whole region, tearing out all railroad bridges, and piling up the track in hairpins on the bushes. The devastation must have been terrible.

I could not get a train for three days, and then only a work-train for Queribabi, which was the end of the repaired section. From there I was told I would have to depend on autos to get across the gap of 44 miles to Carbo, where another train would take us up for Hermosillo, and that it was doubtful if I could get through with my baggage. So I spent three strenuous days botanizing at Nogales. Then an engine hauling two passenger cars, several freight cars fitted with board seats, and other cars loaded with timbers and rails, pulled out, crawling along at ten to fifteen miles an hour, and in an hour reached the summit, some 4,000 feet altitude, in a rolling country, all grassed over, and looking orchard-like with the many live oaks. Then we slipped down along a gentle slope, and through a box canon to the ancient city of Magdalena. Then soon left the hills and out on the plain which was covered with brush about ten feet high as far as the eye could reach. Here and there a ranch house relieved the monotony, but these were often squashed down in the last rain. Most of the houses in the region are made of sundried brick, and if for any reason they are not protected by an overhanging roof, the rain soaks the bricks up and they squash down like mush. After many miles of trundling along the improvised roadbed we reached Queribabi, where

we were dumped out in the brush. This place was a station and a water tank. All sorts of autos were waiting in the brush, and every one seemed to be engaged to carry passengers who had booked ahead, but I finally found a Ford truck that was not engaged, and the driver, a boy, agreed to carry me to Carbo for 20 pesos. The car was like most Mexican cars, in the last stages of decomposition, but it would run. So we were soon off, flying along at the rate o f 25 miles an hour over a 10 mile an hour road, rattling, pitching, jolting and slipping along, the devil knew how, but hitting the high places and all the mud holes, and diving nearly straight down into new washes 10 feet deep, and out of them by the skin of our teeth, but always getting there, as Fords do. And so by night we drove up to another rambling railroad town, Carbo, in the brush by the side of what once was a raging river, but now a great sand stretch, where the round house was hanging by one corner where the flood had left it. There was a sea of faces, men, women and children, and dogs. There had been a string of houses facing the track, but half of them had squashed down in the last rain, and the people had set up some poles and made a temopary roof of brush, which would protect them from the sun. My baggage was piled in the waiting room of the station among the babies and dogs, and I elbowed my way through the throng to get something to eat. Most of the people slept anywhere where they could get room to lie down in the brush, and they would put a tin can on a fire and make some vile coffee and cook sometortillas and call it a meal. The men worked on the repair gang mostly, or gambled for a living, and they had their women along, and wherever they had put up a shelter that was home. I soon found that there was no cafe nor hotel there, but was told a woman was making coffee and tortillas near by. So I went over there and asked for something to eat and she said "Quien sabe." Then I made a motion of eating and she said "Si," and soon brought out some vile coffee and no milk, some chili, and tortillas, and charged me veinte cinco centavos. Then I sought a place to sleep. I found that at a ranch, half a mile off, I could get a cot for a peso, and so I posted over there. Returning the next morning I struck off across the wash to botanize for an hour. Then when I reached the station house I found my grip had been stolen. I hunted up the station agent and made a roar about it and got him to start with me for the jefe politico. Just then two Mexicans came up with my valise and said they had found it out in the brush, rifled, and my things scattered over the ground. So I paid each of them a peso and took the grip and jumped onthe outgoing train for Hermosillo. On the train I opened the grip and found it had not been opened. So the men worked a cute little graft on me and I fell for it.

All the way down the plain were the remains of fallen Mexican houses wherever we passed a ranch. Everywhere was devastation, washouts, railroad rails hung up on the bushes where the flood had left them, and the brush bent over, and the soil gutted out. There were no forests anywhere, but brush everywhere, 10 to 20 feet high, and almost every bush with sharp thorns that tore the flesh and clothing. We rattled and jolted along at 15 miles an hour till we reached the first station out of

Hermosillo, Ortiz, which was a military camp. There we switched three cars of soldiers on the train to protect us from the Yaquis. The soldiers looked like country boys in their bare feet, with white pants, a shirt, and sombrero, and a gun and cartridge belt and machete. About all they can do is to swagger around. The Indians say they can't shoot. They seem to have a deadly fear of the Yaquis.

Then we rolled on to the beautiful Hermosillo, the capital of the State of Sonora, a city of 10,000 people, situated on a rise on the flanks of a marble mountain that drops down to the Magdalena river. There are extensive ranches here, with sugar cane, corn fields, orchards and oranges, dates, and fruit trees. Cultivation is slovenly as usual, and devil grass is everywhere. The mountain is a conical uplift, perhaps 2,000 feet high, and covered with brush, and many interesting plants. Practically a week was spent on this mountain before I had collected all its species. Then an opportunity to visit a mine, some 20 miles out toward the Yaqui region, and in the Yaqui country, came and I rode out there and saw for the first time the beautiful Lysiloma candida with its waving wands of foliage.

At Hermosillo I lost my botanical note-book and all my papers, passport, etc. Believing that they had been stolen from my room while I was at lunch, I went to the Secretary of State, reported my loss and asked for a new passport. He replied that if I would get some one to identify me he would issue a paper that would do for the state of Sonora, but that I would have to get others if I visited other states, when I got there. I had taken a letter of introduction from Claremont to the Congregational minister at Hermosillo. So I appealed to him to introduce me to the Secretary, whom he personally knew. So we went to the office to fix things up and the Secretary refused to take the minister's identification. I knew that all the clergy were *personae non gratae* to Mexican officials, and that the white ministers had been expelled from the republic, but it never occurred to me that this would make any difference in my case, but it did. There was but one other man in the city whom I knew, a German mining engineer, whom I had met for the first time at Carbo. So I went to him and told my story. He replied, "Sure, I will go and lie for you." Well I did not ask him to lie for me, but this was his way of putting it. He was a state court expert, and had a standing in the state. So the next day we went to the office of the Secretary of tSate, and he went in and told the Secretary that he had known me all his life, and that I was all right. So I got my paper. About two weeks after that the President of Pomona college got a letter and package from the Baptist minister at Hermosillo, who wrote that he was out on the mountain walking for exercise and found my papers scattered around onthe ground, and because he did not know where I was, he decided to send them to the college. Later on it appeared that he had heard of my being in the city through the Congregational minister, Rev. Elias. The receipt of the letter caused some consternation at the college for fear that I had been murdered. A few days afterward a letter from me to Prof. Munz came in which I narrated the loss of my papers, supposedly by theft, but actu-

ally they had fallen out of my pocket as I went through the brush.

From Hermosillo I took the train for Guaymas, some 70 miles off. We were escorted by the usual guard of three car loads of soldiers. Guaymas is a fine city on a landlocked bay, which is large enough for a great naval base, and is surrounded by volcanic hills at least 2,000 feet high. Since my object was to get over on to the peninsula as soon as possible, my stay was governed by the time the next steamer went to Santa Rosalia, which was the next week. This gave me a few days to collect in this rich botanical region, and which had been visited by many botanists before my time and therefore was the type locality for many new species.

A peculiarity of all Mexican ports is the stevedores, a guild of loafers, who insist that all steamers shall load and unload by boat even if there is a wharf to which they can tie up. So after I had bought my ticket I could not go on the boat while it was at the wharf, but had to wait till it got in the stream and then hire a boatman to take me and my baggage to the boat. The boat was the Dorado, a tub of an affair, that as soon as it got into the open sea pitched and rolled and shipped water beautifully, an ideal seasick concern. Then there was no stateroom or bunk, and you had to roll up in your blankets and sleep on the deck or sit up on the benches. Then there was no eating system, but you took what the crew got or went without, and what the crew got was a mulligan made out of potatoes, strong onions, carrots or the like and squares of jerked beef, so hard that you had to eat with a sledge hammer; then there were tortillas, frijoles, and vile coffee made out of burnt coffee, and no milk. This was the menu three times a day, and every day. If there was any mulligan left over I suppose it was warmed up the next day. It was a treat one day to have some dates spill out of a sack, and have them passed around by way of dessert. Then an added pleasure (?) was the water that the boat shipped every now and then when a particularly obstreperous wave insisted in coming over. Then the floor was awash with four inches of water. The next morning we reached Santa Rosalia, a copper mining camp and smelter, presided over by Frenchmen who could not talk English. We stayed here all day, and I took advantage of the time to go ashore and botanize. There is no hurry among the Mexicans, and if there is no cargo to unload or load they loaf just the same, probably to let the machinery rest after the strenuous trip across the Gulf. As night began to fall we slipped out of the artificial harbor and rolled on our way to Muleje. Arriving there the next morning we rounded a rocky point and into a tiny bay, which was what was left of a little stream that flowed out of Conception Bay and on which the town of Mueje was located, a few miles above and out of sight of the boat. Here we also loafed all day. Then at night we pulled anchor and were soon rolling along in the open sea. The next morning we reached the offing, a steep and sandy beach where long log boats are the only means of getting ashore, and where they land for the city of Loreto, which lies back a mile or so among the cocoanut palms and dates and sugar cane. This used to be the capitol of the state of Lower California, but it proved to be more

convenient to split the peinsula in two and make one capitol at Ensenada, and the other at La Paz. There being some 800 miles between. Here we stayed all the rest of the day, loading oyster shells and dates, many tons of them. The dates were pressed into a solid mass in coarse gunny sacks, whose ends were securely sewed together, the whole wighing over 100 pounds. It should be noted that this is the pearl oyster region. It was interesting to see how they launched these crude dugouts. The boats were 20 to 30 feet long and 3 to 4 feet wide and high, and usually manned by four men with paddles. When we arrived about a dozen men would arrange themselves six on a side of a boat. Then they would pass a pole through some rope loops across the boat and put the pole ends on their shoulders and straighten up and so lift the boat off the ground, then march down the beach and into the water, pull the poles out and shove off between the breakers. If it was done just right, no water was shipped, if not they got a ducking. The men wore overalls and went barefoot, but had on sombreros, otherwise naked. When a boat landed there were enough men ready to shove each boat far up on the sand as the breaker bore it in. But the man in the stern usually got a wetting, but that was only a part of the game. They would soon dry off. The Sierra Giganta rises high back a few miles from the plain on which Loreto stands, and doubtless furnishes the water to support the town.

By night we had loaded all the stuff and were off again over a smooth sea, crossing the great fish-hook bay that extends from Loreto to La Paz. The next day we passed the great island Espiritu Santo on our left and reached the headland that runs out many miles from La Paz to the east. Why we did not go straight to La Paz instead of a long detour to the east soon became evident as we hugged the eastern shore, which was the only place where enough water existed to float a ship.

We could dimly see the great shoals and flats and sand dunes covered with the Mangle (Rhizophorus Mangle), a tangled shrub as high as one's head which puts out knees, deflexed branches which root at the ends, and forms an almost impenetrable barrier. This would make ideal hiding places for alligators and snakes if these were any on the peninsula, but there are none, though they are plentiful on the mainland almost as far north as Guaymas. The presence of buoys marking the narrow channel close to shore, where all the steamers sailed to the westward to get to La Paz, was unique to us, since the shallows did not show on the surface. After a few miles we came to a lighthouse on a point which we rounded and dropped anchor in Chiquilingue bay and took on some salt freight. This is a little landlocked bay and the only safe anchorage in northwest storms. Soon we were off again for some ten miles and passed in view of La Paz, the largest city of Lower California, which is located on the bluff that rises abruptly some 50 feet out of the sea. There is an anchorage some two miles wide here before the great sandspit is met which forms the barrier of the La Paz harbor. There is a modern pier here but the boat anchors out in the water and is soon surrounded by dugouts, all soliciting passengers. These boats are mostly such as we saw at Loreto. This was the end of my sea journey and so I dumped my baggage in a

boat and struck out for the Palacio hotel, without first barganing with the owner for my passage. After half a mile of rowing we came opposite the hotel and landed and the men shouldered my baggage and struck off for the hotel. Arriving, the landlady, Mrs. Meyer, a widow, who was educated in Los Angeles, but a native Mexican, cordially received me and spoke good English. The boatman stuck me for 5 pesos for carrying my baggage to the hotel, which was more than two prices for the work. La Paz is an ideal town, like Mazatlan, for a honeymoon, so dreamy and calm and quiet along the water front. Here all day long the pelicans sweep along the surface and plunk down sharply into the sea when they see a fish, going down with a splash, struggling a moment with the fish and then elevating their heads and letting it slump down their throats. Then a swallow and another flight, hour after hour. Once in a while a gull will shoot down on the pelican and rob it of its prey. Occasionally we see porpoises slipping in and out of the water like greased pigs, in single file, apparently just doing it for the fun of it. Many fishing boats lie here, as well as pearl fishers, for this is the center of the pearl traffic. This is a regular port of call for the largest ocean steamers. Almost every day sail boats come in loaded down to the water's edge with sacks of tanbark, Lysiloma candida, for the great tannery here. Just now this is the only business except pearl fishing that keeps this city of 10,000 alive. There is no water or streams anywhere in this region. All the water is raised by wells and by wind mills imported from the U. S. It is very hot and dry here. Cocoanuts and palms adorn the town and the beach. The houses are all the usual Mexican style and the streets are unpaved except in the main business part, where there is some brick paving, and along the wharf. There are two roads going out from here. One goes 125 miles to Cape St. Lucas to the south, and the other goes to Todos Santos and Pesquidero, 60 miles to the westward, on the Pacific side. This road also branches and goes to Santa Magdalena Bay, about 125 miles off. The road is an ordinary country road for wheeled vehicles, and safe at 10 miles an hour with autos.

I was much interested in the flora here, all so different from what I had seen before. I spent a week or two, getting most everything that was available. Then a steamer happened along, the Washington, a Mexican Lines boat, bound for Mazatlan. This was a very unusual occurrence for a boat to go to Mazatlan instead of the Cape. But as I was getting to the end of my purse I decided to take it and spend a few days there and then strike out for home. La Paz lies on bench land adjoining the sea, but to the south and east hills arise a thousand feet or more high, having quite an interesting flora. Beyond the city there is a succession of higher hills that at last become quite high mountains, but I did not get to them. The shore to the east was a very fertile region for me.

Mazatlan is the most beautiful city in western Mexico and also the largest. It has a natural harbor of some size but is all silted up by a big river which comes in from the east, and no attempt has been made to dredge it out. There is a rambling wharf and custom house where launches land from the boats, and where lighters are drawn up. There is

a fine lighthouse on an adjacent island and a radio station. There is a crescent beach of great beauty facing the sea, a fine promenade made of cement which extends to the business houses and hotels. One could sit all day along this beach and dream as he listened to the roar of the surf, at his feet. At some distant day in the past crude forts were built to protect the city from assault from the sea, and there are still some old smoothbore guns rusting on their ancient carriages, but the fortifications are falling into decay, the best argument for the pacific disposition of the U. S. Beautiful paved roads have been cut along the beach and around the hills for scenic purposes, and one loves to stroll along them in the evening. Mazatlan lies between rather lofty and steep hills, densely clad with tall brush. It is a very stately city with many fine old buildings, and paved streets. Three days were spent here in strenuous botanizing Then the long trek for home. As you roll along over the plain northward you find the brush is taller, some 20 feet high, and often large trees appear scattered in it, but no real forest. Along the rivers are large areas of bamboo-like grass, 10 to 15 feet high, and occasionally forests of cottonwoods (populus dimorpha). The rivers are about 100 yards wide and full of water. No roads appear anywhere except in the immediate vicinity of towns. There is still little grass.

Going north from Mazatlan the vegetation continued much the same to Culiacan, and the country was much the same, brush everywhere, with an occasional clearing and a ranch or small town. From Culiacan north there was some reduction in the highth of the brush, but the cactus became more evident, consisting chiefly of Cereus Pringlei and Thurberi. There were many square miles punctured thickly with these cacti. Night brought us at Culiacan and we saw nothing till the next morning at Navajoa and Cajeme, big towns, where they have modern systems of irrigation, and great factories. After Cajeme we had the same escort of soldiers in armored cars to defend us as we passed through the Yaqui country. Each railroad station had much the same protection as we had seen above, namely, a dirt wall about six feet high, and behind that a trench filled with soliders' quarters, generally forming a square, in the middle of which was a two story square fort made of adobes, and a cupola on the top for a lookout. There were no field pieces, the weapons being only rifles and machine guns. The brush was entirely cleared from around the railroad on both sides for at least 100 yards, and outside the dirt wall were strings of rifle pits, which consisted of holes about six feet long by two feet wide and a foot deep, just enough for one solider to lie down. Often these pits continued along the track for a mile. Soldiers were everywhere at the station and their women with them, but there was little evidence of any real drill or order among them. At Vicam station was the center of the Yaqui and a mile or so toward the sea was the town or capitol of the nation. But when I was there the town was deserted, and there was nothing at the station but the ashes of the Yaqui huts that had lined the railroad track for half a mile. It was at Vicam that the Yaquis robbed a train and massacred some of the passengers a short time before I was there. It was also at this station that they held up General Obregon's

train, and could have massacred the whole train load of soldiers and civilians, but by a ruse he got in touch with Guaymas and let them know that he was surrounded there by Yaquis. This led to the immediate dispatch of a train load of soldiers who got there just in time to save the General. The Yaquis, finding themselves outnumbered, decamped, and the soldiers in revenge burnt all their dwellings. Near by is a long range of mountains which has always been the rallying point of the Yaquis, and to this they retired. The Government bombed it with airplanes but never dared to send troops into it. The soldiers were deathly afraid of the unerring aim of the Yaqui marksmen, and of the deadly hatred for them. When there were too many soldiers for the Yaquis to exist on the plains they scattered to the various mining camps and worked in the mines and sent supplies to their families in the brush. Many of them crossed the border and got work in the American mining camps, but there were always enough to keep the soldiers in hot water. Finally the Government, finding that they could not drive them out nor kill them, renewed the old pension system of paying every Yaqui so much money per month so that he would not fight them. And this seems to be the arrangement today.

We reached the suburb of Guaymas, Empalme, at night, and remained there all night, till 8 a. m. the next day, when we pulled out with our usual quota of soldiers. We passed through Hermosillo and then Oritz, where we dropped our military guard, and rambled along to Nogales by midnight. Nogales consists of two cities, one on each side of the line. Nogales, Arizona, is an up-to-date American city, with clean streets, and modern improvements, and sober and intelligent people. It goes up to a certain wire fence some ten feet high, which forms the Boundary. On each side of this fence are the custom houses of the two nations. On the American side I saw no confidence men nor grafters. On the other side were plenty of men waiting to skin a stranger or get a graft for pretending to help him to get his baggage acrossthe line. What these men do not know about customs would fill a cart load. My baggage was duly inspected and passed. I then got a man with a cart to haul it over the line to the American custom house. There, after asking my business, they passed my baggage without inspection, and I soon had it checked for home.

Then came a strenous summer of study and work getting my sets ready to distribute, but I could not get done in time to go down in the fall as I wanted to do. It was again winter when I was ready and found myself at Nogales in 1927. There was nothing in bloom at Nogales. The train schedule was the same as before, every other day a train going south, which was a regular passenger train as far as Guaymas. Thence southward was a mixed train.

I spent a day at Guaymas in an excursion by motor boat to the mouth of the bay, and botanizing on various islands. The next day I botanized on the mountain to the north. Then the third day found me on the train bound south. We took on the same quota of soldiers as before at Empalme, and passed through the whole Yaqui region as before, and the second night we reached San Blas, Sinaloa. This is one of the

oldest towns in western Mexico on the Fuerte river, and is about 50 miles from Toplobampo Bay. It must not be confused with San Blas, Nayarit (Tepic), which is a seaport, which was explored long ago and the flora reported by Hooker and Arnot in Bot. Beechy. This San Blas is at the junction with the railroad that goes from Toplobampo Bay to Los Mochis and on to the Sierra Madres and central Texas. But at that time was completed only 60 miles east of San Blas. I spent a littel over a week at San Blas, and then took the stage for Los Mochis, 30 miles off. This is a modern town with a sugar factory, and is the center of the great tomato and mild chili gardens, which ship train loads of tomatoes and peppers daily in January, February and March, before the Imperial valley producers get on the market. I was escorted around by the superintendent of one of the great concerns, and collected some plants on the way. Then I returned to San Blas and took the next train for Mazatlan.

I reached Mazatlan Saturday night, and had to stay there three days till the next train came along. This time I put in on strenuous botanizing.

The train pulled out in the morning and we spent the day dragging along to Tepic, following up a river leading into the mountains and away from the sea. From Mazatlan southeast there are several low ranges of mountains more or less parallel with the main Sierra Madres, which as usual form the crest of the drainage from Arizona to the volcano of Colima. Between the ranges are valleys affording some arable land, here and there, where there are cities and settlments of smaller size. Tepic is one of these. It is a quaint old city, with typical Mexican architecture, a great cathedral, central plaza, and paved streets, paved with cobblestones. All around the plaza are stalls or booths, where the natives sell all sorts of produce and manufactures, and gossip all day. The central part of the city is full of fine Mexican stores, and swell hotels, after the Mexican fashion, where you pay 4 pesos a day for room and board. I stopped at the Hotel Bolo de Oro, or Golden Bowl. Just before I got there the President of the republic had sent some soldiers to arrest the Governor for some defalcation. So he was promptly deposed and a new one put in without making any particular ruffling of the surface. So easy do the natives take this modern despotism called a republic.

Tepic lies in what seems like a round valley hemmed in by volcanic hills which are one to two thousand feet high, and toward their tops have forests or at least scattered trees of live oak and pine. I should judge that it is at least ten miles across the valley. The Tepic river comes in from the southeast and meanders along, half marsh and half river, often completely bridged by Trapa, and seldom if ever over 4 feet deep. In it the cattle walk up almost to their necks and browse on the Trapa, eating swaths through it. The ground near the river is swampy and full of grass, and hard to get through. Then come fields of cane, and on the higher lands grow corn and vegetables. The river meanders out of the northwest corner of the valley, and thence down toward the Ocean. Tepic is a very old town, but an educational center, and has an unusually intelligent population. It is on the very old *camino real* that comes in from central Mexico through Guadalajara. This road is a wide trail, and is

deeply furrowed by the feet of many thousands of animals. In places it has been converted into a wagon road. Trails lead out in all directions from Tepic into the adjacent mountains. It was here that I was warned not to go out into the country for fear of brigands. This warning was given me before I left California. At Tepic I met people ranching out in the mountains, and who had come in on horseback to transact business in town. One of these men, an Englishman, became friendly to me and wanted me to go out to his ranch and botanize there. It was a two days' ride out in the mountains. I asked him how about bandits. He said, "Well, I have been here nine years and never saw any." It should be remarked that Mexicans are usually peaceable and harmless, but they live from hand to mouth, and are the prey of political grafters, and in dire necessity from shortage of food are potential bandits. Then just now there is general hostility to the Calles government because of its expulsion of the Catholic clergy. The rank and file of the Mexicans are Catholic, and the women resent most strenuously the expulsion of the priests. No doubt that clergy was responsible for many iniquities, political, for they cannot keep their fingers out of politics.

I paid no attention to any warnings about bandits, but went out into the hills to botanize wherever I thought I could get specimens, but I did not do the region thoroughly for lack of time. It is a rich region botanically. On the mountain a few miles south of Tepic I found a rich flora on its lower slopes, below the pines. There was a runaway irrigation ditch, that in some great storm had cut a gully 50 feet deep through the gravelly soil as it came out from an old ranch. This gully was perhaps a mile long, and rarely over 20 feet wide, and with mostly vertical sides, and was a mass of vegetation throughout, no end of ferns and herbaceous plants. It surely was a treat to botanize there. Then on the open slope of the mountain were all sorts of flowers, mints, lobelias, various species of plants belonging to the Evening Primrose family, Erythraeas, Lopezias, Compositae, Solanums, and many ferns I never saw before. For three successive days I tramped up there some five miles from the city and came back loaded with specimens. Then I spent a day along the river, we would call it a creek. It was 15 to 30 feet wide, flowing very sluggishly, and with mud banks little above the surface of the water. In a number of places the water was bridged by the water hyacinth (Trapa), forming a complete carpet over the surface. This is the same plant that forms such floating islands on the lower Nile in Africa, and covers many rivers in Florida. The cattle are very fond of it, and I saw several cows walking along in the middle of the river and eating a swath through it, and only their backs showing above the surface. They would not dare do this along the seacoast where the alligators abound, but at Tepic there are none. I saw no venimous snakes. There were several places that I desired very much to visit there but lack of time prevented. I then took the train some 70 miles up the railroad into the mountains to Ixtlan, and I botanized there three days. At this point there is a very old and much used trail leading south and east into the Guadalajara country, which is on the other side of the Sierra Madres. This trail was in some places

20 feet wide and with half a dozen paths cut down several feet into the soil by the feet of saddle and pack animals. There are no such trails in the United States, not even in the mountains where there never were any wagon roads. It takes a strong imagination to realize that for hundreds of years, while our own country was in the making, the Mexican mosos were trudging along over these age-old paths, even before the Pilgrims landed on Plymouth Rock Here they have eked out their scanty living and lived their tragedies, and got nowhere under Catholic rule, while the Protestants at the north have carved out a nation second to none. We can hardly blame the Villas and Maderos who have seen the contrast and given their lives to redeem their people.

After three days at this quaint old town of Ixtlan I again took the train for the end of the road, some 30 milesfarther, at La Barranca, which lies at the foot of the Sierras. This was just an old ranch and a temporary construction camp. After some hunting I got a buggy canvas cot in a brush shed for a peso a day, and had to hunt my meals where I could. Barranca I suppose means a box canon, and there was a box canon nearly 2,000 feet deep that the railroad had to cross on a bridge that was being constructed. This canon was so steep that it was almost perpendicular, but I managed to get down it by climbing down the vines and grass, and I reaped a rich harvest of specimens on the way. Then when down to the bottom I had to climb out again, and this was no picnic, but I got out some miles farther up and along a draw that had a ranch or two along it, and some sugar cane growing. But it took me all day to reach the bottom and back again to the town. I made the richest haul of botanical specimens here of any. Then the next day I lugged my baggage back to the station and checked it for Acaponeta, which is about 70 miles out of Mazatlan, and between Tepic and Matzlan, and only a few miles from the Ocean. When I was making a pack horse of myself to get my baggage to the station the train came in, and a crowd of passengers got off and took saddle horses or burros or went afoot on the trail to cross the barranca and get to the other end of the road coming out from Guadalajara. As I passed the crowd a well dressed Mexican shouted from the crowd, "Hello, hombre" at me. Then I took another look and saw that he was a Government official that I had met at La Paz the year before. So we waved our hands and smiled at each otheras we passed.

I had to stay all night at Tepic, but the next morning the train was made up for the trip north. It was a delightful down the river and out on the costal plain at Acaponeta, which we reached in the evening. This whole region has always been infested with bandits, and doubtless this was the reason we did not travel at night, but we had no escort of soldiers, and of course saw no bandits. It so happened that a good hotel was at the station, on the city side, and I had met the proprietor before, and so I was soon in a good room and my baggage around me. Across the way from me was a military post with a company of soldiers. Acaponeta is quite a city, and it was about a mile from the depot to the center of town. At the hotel in the city I met an Aemrican engineer who was working, with other Americans, the El Tigre mine, some 26 miles to the

eastward, up in the mountains, and I was cordially invited to call on them at the mine, which was some 3,500 feet altitude. I began botanizing at once around Acaponeta. Like all the rest of Mexico it is all brush as soon as you get out of town. To the north was quite a mesa a few miles off, where I got many species. To the south of town was the Acaponeta river, 100 yards wide and several feet deep, and along it were some ranches, there was a large sugar cane plantation just across the R. R. bridge, where they were making sugar. In the river and up to their hips in the water were the women washing clothes. I spent about a week here till I got the bulk of the flora. Then I hired a Mexican and two saddle horses to take me up to the mine. It was a five hours' ride and we had to start about 4 o'clock in the morning in order to get well up before it got too hot. I had not ridden a horse for five years, and the Mexican saddle made riding a Purgatory for me. It surely was torture. After two hours of it I had to get off and walk. Then remounted and had more Purgatory till we forded the river some 10 miles up, and began climbing the hills toward the mine. Then we came to a ranch where we got breakfast of tortillas, beans and coffee. The women cooked the food on an open fire as they all do in Mexico still. Then we remounted and rode along the increasingly steep trail to the mine. I did very little botanizing on the way up, but after a while we got into the live oaks, and then to the mine, which hung on the steep slope of a mountain, with quite a little town below, where the miners lived. It surely was good to get among Americans again and to get a real American meal and to sleep in a real Aemrican bed. I had a delightful visit with the engineers, and learned much about the history of this, one of the most famous gold mines of western Mexico. I stayed over night and did considerable botanizing on the mountain. The next morning I started back and botanized almost all the way back to Acaponeta, getting many new things and one new fern. The torture of riding was worse than the day before, but I could relieve it partially by getting off and botanizing along the way. I reached the city late that evening, but loaded down with fine things. Then came the long trek home, some 2,000 miles by rail. I did no further botanizing. I reached Mazatlan duly and stayed over night and then got all my baggage checked for Nogales, and by dint of getting a berth in the Pullman and my meals in the diner I got through in fine shape.

We reached Nogales, Sonora, about midnight, and promptly debarked and struck out for the American side, hiring a boy to carry my valise. At the fence the boy said he was not allowed to go farther, and so I paid him off. Then I had to hire another man to take me the rest of the way. The guards passed me with little fuss, and I landed at my hotel, happy as a clam to get back into America again. It surely did seem good to see the stars and stripes again. The next morning I went over to get my baggage. I had to visit the custom house to get my passport canceled. Then went over to the baggage room and was wiating for the inspectors (Mexican) to look over things to see that I was not evading any export duty. I was standing there in some trepidation for my turn when a slap on my back and a cheery "Hello, Professor," from the chief

inspector, and a hearty handshake. I surely was relieved at such a warm reception. After I got my breath I said, "I have seven big bundles for you to inspect." He turned to the examiners and said, "Esta Bueno," and waved his hand, and I thanked him and passed out with all my stuff without inspection. Then at the Aemrican custom house, on the opposite side, the chief inspector said, "Is it the same old gag?" I said, "Yes." "Then go on," and away I went, and soon was all checked for home. I learned long ago that the way to get along with custom officials is never to try to put anything over on them and to keep my mouth shut.

Then, after a week's rest at home, I pitched into numbering my plants and labeling them, which took all summer before I had my sets made up and ready to distribute. But I had not yet studied them to identify them.

Time slipped by very fast till it was January again. Then I took the steamer Jeanette R., on January 12, for San Jose del Cabo, after paying $40 for my passage. Then began some dirty little grafting by Hansen, the owner of the boat. I was informed that the boat was a freighter and could not carry passengers and that for that reason I would have to sign up as a member of the crew. Then I was told that members of the crew could not carry baggage and all my botanical stuff would have to be shipped as freight. Hansen had already put my things on the manifesto. I did not know what it meant, and did not care so long as I got to my destination. After 4½ days of sailing we reached San Jose del Cabo and were landed in the surf. Then I found I had to pay freight duty, and Consular fees amounting to $10. Then I also found I had been skinned out of $5 more than the regular fee for passage. And so I found that the Mexicans are not the only grafters.

I found a very kind and considerate friend in a native Mexican, Mr. Consaca, who was president of the board (city council) at San Jose del Cabo. I spent a very strenuous and profitable week there botanizing. Then one day chief of police, an intelligent and efficient young man, came to me and asked if I had a permit to botanize in Mexico. I said "No." "Then,' he said, you cannot work until you put up a 1,000 peso bond and get permission from the Secretary of Fomento (Secretary of Agriculture) at Mexico City. My Spanish was not adequate to a discussion of the matter with him and so I took him to Mr. Consaca, who interpreted for me. I had been informed before I left Claremont that such a law had been passed to cinch us foreigners the year before, and I was warned not to go to Mexico and attempt to collect But I thought I might bluff my way through in some way, and so I did not and would not put up any such bond. In addition the law required that I give the best set of specimens to the University of Mexico. I thought the matter over night and then decided to go to some other city, where they did not have a chief of police, and work. But consulted friends, all of whom advised me not to do it, for they said the officer would telepgraph ahead to any place where I went and have me arrested and fined heavily if I tried it. My only recourse was then to go 125 miles north to the Capitol and see the governor and have him fix me up, or leave the country. So

I struck out for the Capitol, leaving my baggage to be brought later. The first person I met there was Don Carlos Leon, an old friend, connected with the Federal Government in Mexico City. After a hearty greeting I told him of my mission, and he remarked that there was a professor from Checkoslovackia who had been there a month and was also hung up for the same reason, but that he would do all he could for us. I did not hesitate to speak in very plain terms to my friend, calling it a dirty political holdup, and saying that if it could not be fixed up I would go back to California and let the folks of Lower California starve. It is a well known fact that Lower California depends on California for its market, and for us to let them alone would mean bankruptcy for them. For this reason the Calles government has been in bad odor with them, and there is no sympathy for the baiting of Americans that was so characteristic of the Calles government, till President Coolidge called Calles down sharply and told him just where to head in at. Since then Calles has been a vociferous friend of the United States. Most all this baiting of Americans arose during the World War, and was fomented by the Germans systematically, who loudly said we were afraid to fight. But Coolidge put a thorough crimp in it once for all when he plainly told Calles where to head in. No doubt Calles would have been promptly deposed if he had not come to time. It is not generally known that the Calles government was also responsible for the passage of hostile mining legislation that has caused nearly all American investors and miners to forsake the republic. I was told at Acaponeta that the taxes were 28% of the gross output of the mines. This was the cause of the shutting down of all but a very few of the biggest mines in Mexico.

After waiting three very precious weeks at La Paz, in idleness, I got a letter from the Governor authorizing me to work without interference. It also took the entire three weeks to get my baggage delivered at La Paz. Then I got to work strenuously again. Then took a trip to Todos Santos on the Pacific coast and spent a very profitable week there, making also a short trip to the base of the Laguna mountains at the Cota ranch, where I found much interesting material.

Then I went back again to La Paz, and the Check professor and I arranged a joint trip back to Miraflores (40 miles from the Cape), where we remained a week and took a trip up the Laguna mountains, on horseback. We were fortunate in getting my friend Pickett to take us in his auto 90 miles to Miraflores, which is about 40 miles northeast of San Jose del Cabo. On our way there we stopped for lunch at San Bartolo. This is an old town located at the great springs which break out of the hills not far below the divide which leads down to the sea south of San Antonio. There many palms abound, and there is much cultivation of fruits which find a market at La Paz. This is a unique region, with many interesting plants. Thence the road drops down rapidly to the sea, which is skirted for some 10 miles to a ranch, and then it climbs up on a mesa-like region, and over on the San Jose river, which drains into the sea at San Jose del Cabo. The first town on the river is Santiago, where they have a sugar mill. Then it is some 10 miles to Miraflores, which

tains. When they found we wanted to explore the mountains and go to the top they told us it was impossible to get there because the trails were all washed out the previous fall. Finally they agreed to let us have one horse only. So I told them we would pack the horse and walk. It is rank heresy for a Mexican to walk. So they finally agreed to let us have three horses, one each for us and the guide. My horse was a mule. In my younger days I was so nimble that I could put my hands on the back of an animal and jump clean over him; now I was so logy that I had to climb on or be boosted on. Then the Mexican saddles are not made right, and a person has to ride with his back kinked. Then the stirrups were too long and could not be taken up. So it was Purgatory to ride at all. But we were fixied up at last and started off. The saddle of the Check was not properly cinched up and for that reason turned on him before he got out of town, and let him down on the ground. This led the horse to antic up, but he was calmed down soon and the saddle replaced and properly cinched. Then came the long trek over the mesa through the brush for 10 miles in the fierce Tropical sun along the trail. Then we came to another river coming out of the mountains, and along it our trail wound up and down across the deep gulches that came in from the sides. Going down one of these 30 degree slopes my own saddle turned and let me down on the rocks on my hip, injuring me considerably. Then my mule, which never had had a saddle turn on him before, got frightened and began to kick and paw the air full of holes. I never saw an animal kick so fast in my life. Then when he could not get rid of the load under his belly he turned to run away up the trail. But the Check was coming down and so blocked the way. The mule then jumped off and fell some 50 feet to the bottom, rolling over and over on the way down. Then he picked himself up and kicked himself loose. By this lies on a mesa lying in the angle formed by a tributary that comes down from the Laguna mountains, which lie back a few miles to the northwest. Miraflores is also a very old town, where they raise much fruit for the San Jose del Cabo market. Everything is primitive, but there is a church, a school, and a few stores. The barber is a rancher who lives out a way and comes in to shave his customers at their rooms. There is but one so-called hotel, a residence of five old maids, old maids are a curiosity in Mexico. The accommodations were typically Mexican, consisting of a canvas cot without bedding, a chair, and a stand, also a kerosene lamp with a dirty chimney. On a back veranda was the eating table, where they served meals, which were brought in from an adjoining house where they were cooked on an open fire. The old maids were curious to see us as we changed our driers and took care of our specimens, and they asked all sorts of questions about them. But they were very polite. The Checko-slav Professor was a young man who could murder the Spanish language a little better than I could, and so he became the chief spokesman. One of them tried a little to vamp him but he was woman-shy. I was a little too old for the game and so was not bothered in that way. After a few days of exploring along the rivers and in the foothills of the range we hired a Mexican to take us up into the moun-

time the moso (Mexican guide) had caught him, and began to toggle up the saddle. Finally it was ready and he asked to have me get on again, but I saw the mule was still frightened and doubtless would begin pitching as soon as I got on. So I refused to mount but walked a few miles to the next ranch, where we swapped off my mule for a better one. After an hour's waiting here and drinking some good milk, we remounted and the Purgatory of riding began again. The trail was the worst one I ever was on, going over and through granite boulders of all sizes, where there was hardly room for a mule's foot, and where the rocks would scrape our legs as we went along, or the brush would tear our clothes. Often the way was so steep that we had to cling to the manes to keep from sliding off, or ride on the horn of the saddle to keep from falling over the mule's head. By night we got to an elevation of 3,500 feet, where a cattle ranch had been once, among the live oaks. Here we wearily slid off our animals, unsaddled and crawled into our blankets. Then came half a night of agony trying to find a place to lie on that did not hurt. Then a short respite of sleep. The next morning, after a hasty breafast, I started out to reap the rich harvest of botanical specimens that formed this veritable floral paradise. It took the most strenuous work till 4 p.m. before I had gathered the flora. Then the Check decided that he could not stay overnight for fear he would not get back in time to catch the next steamer at La Paz. So we back-tracked four miles to the river that afternoon and camped in the brush, and the next day we reached Miraflores, loaded down with scientific plunder and dead tired and worn out. Then a night of real sleep, and the next day a strenuous one taking care of our stuff. This ended my botanizing in 1928. In due time we reached La Paz, just in time to miss the Checko-slav's steamer, and to catch my own steamer for San Pedro. I had some trepidation as to how I would get all my 14 big bundles of botanical specimens home. But I followed my usual custom of sawing wood and putting my stuff on board without any fuss. The custom officials did not bother me nor ask any questions, nor did the steamer officers list my baggage as freight, as I had feared they would. The Americans on board, when they saw how well I go along, warned me that it would be different when I got to San Pedro. Well, at San Pedro I showed my papers and the inspector passed me without question.

After a week's rest I began sorting out and labeling my collection, which took me till June. Then I bundled a complete set of all my plants into an auto and struck out for Berkeley to compare my material with that of the Brandegee herbarium there.

I spent five very busy weeks at Berkeley till I had determined the names of most of my species except the new ones. Then, a return to Claremont and a systematic study of all the literature followed, which consumed the rest of the year. I had already spent much of three years in making out a complete list of all the plants known to exist in the entire region. The results of all this work are embodied in this report.

BOTANICAL NOTES MADE ON MEXICAN FLORA ON TRIP IN THE MONTHS OF OCTOBER AND NOVEMBER, 1926

Nogales, Arizona, is on the drainage of the Santa Cruz river, 59 miles south of Tucson, 3,800 feet altitude, and over 1,000 feet higher than Tucson, in the upper edge of the Tropical life zone, screw-bean area. The topography consists of rolling volcanic hills, apparently sand, seemingly stratified. The shrubs are mostly screw-bean (Prosopis pubescens), some Sambucus glauca, some Fraxinus (pistaciaefolia), Baccharis sergiloides, rarely a scrub oak (Q. undulata?), but screw-bean everywhere even on the hills. Some Yucca (like Mohavensis but not that species), but leaves shorter, Nolina, Daslirion, rarely Opuntia of the occidentalis class. No Cereus. Hills covered with grasses which are mostly Bouteloua curtipendula, eriocephala, an annual sp., hirsuta, Eragrostis, Muhlenbergia debilis, Andropogon scaccharoides, glaucus? Panicum autumnale, P. scoparium ?, Sporobolus ramulosus, cryptandrus. Tragus, Aristida Californica but a grass 1-2 feet high and very abundant, Heliomeris annua very common. Aplopappus gracilis, Verbesina encelioides, Ipomoea 3 species, Lagenaria, Acalypha, Euphorbia, prostrate species, Pectis, 2 sp. Brickellia.

October 25, 1926. On train going south, 4,000 feet altitude. Still going up, out of the mesquit and into the live oaks (shiny black oak). Villanova common. Senecio Douglasii common. Ambrosia, Aplopappus gracilis very common, some Heliomeris. Country is a great rolling prairie with much oak and a little drier than Nogales after we reach the top and begin to descend. Agua Zarca Station, 3,800 feet altitude. Oaks nearly gone, mesquit coming in, Xanthium on flats, Heliomeris, Fraxinus pistaciafalia, also Populus Fremonti on flats. A pond of water on the left and ranch. Salix amygdaloides (group) Grasses the same as before. Sambucus glauca. Cultivated squash, corn. Eriogonum annum, Chenopodium ambrosiodes. Smooth outlines of hills show they have long been grassed over. Baccharis sergiloides. Walnuts (Calif.). Now come to a stream flowing south. Chilopsis, Acacias, Beorchaavia, brush houses. Spirogyra, Dalea mollis ? Setaria glauca. Celtis occidentalis, Vitis Ariz., Ambrosia very common. 3.300 feet altitude. Oaks now gone, mesquit everywhere. Cult. potatoes and corn, Crotalaria. Cibuta Sta. Big black willows (S. amyg. ?). Amarantus fimbriatus, Celtis, Helianthus annuus Platanus, screw-bean, big Celtis occidental, 40-50 feet high. Pluchea borealis, scattering oaks again. 3,100 feet altitude passed through canon with quartzite looking eruptives. Thurberia, Baccharis viminea. Station, did not get the name. Dense brush, peach trees, Vitis, Walnuts, Celtis, Setaria glauca, Cucurbita perennis, sunflowers 10 feet high. Quite a stream on the right, much Platanus, Fouquiera on the hills. 2,900 feet altitude. Grass much shorter, Cylindropuntia prolifera group, also spineless flat Opuntia and large, not cultivated. Cumeral station. Umbrella tree (Melia azedarac), much mesquit, much Fouquiera splendens, Baccharis sergiloides, a little Heliomeris, Rhamnus-like shrub, Ambrosia trifida or something that looks just like it, 10 feet tall or more, in moist

places in fields, mistletoe on Mesquit. Ranch, black soil. Condalia ? Megarrhiza. Immuris station, 2,700 feet altitude. Red-headed Mexican woman. Mulberry tree, tall white Gnaphalium, Eupatorium-leaved Brickellia, more Ambrosia (like trifida), much Salix amygdaloides and Populus Fremonti. Cross stream, 10 second feet. Ranch. Another Baccharis like sergiloides, bamboo.

Imuris station, 2,600 feet altitude. Town on mesa. Baccharis viminea. Small river 20 feet wide. Heavy flood damage evident, many cottonwoods down, flat badly washed. Erigeron Canadense species. Red Ipomeoea. Eucalyptus vimineus, a fruit looking like an apple but with an umbilicus (a quince), they call it vijos, and membrillos oranges, olives.

Pierson station.

San Igancio station. Now in wide valley, much vegetation, getting hot. Mountains 2,000 feet high 5 to 10 miles off. Corn. Soil very fertile. Opuntia Tuna, many tree (black) wlilows, Sorgum Halapense. Red and tall Mallow, 3-4 feet high. Ambrosia 10 feet high. Much Sambucus, Membrillo trees all browsed up 5 feet from ground. Annual Bouteloua (prostrata ?). Nicotiana glauca. Much Hymenoclea. Sugar cane. Corn.

Magdalena, 2,300 feet altitude. Chaenactis, small leaf, Ambrosia psilostachya still here and there. Phoenix Canariensis. Houses dilapidated. Erect Cereus Schottii. Fouquieria used for fences, and growing. Cement works. Bamboo in flower in long spikes, another river coming in from the east (Magdalena river). Black lava flows cracking up in square blocks and forming vertical faces. Opuntia Tuna 20 feet high, cultivated. Cultivated grapes, castor oil, corn. A low Fouquieria. Thicket of Mesquit, Opuntia leptocaulis, big morning glory or leguminous vine. Opuntia like leptocaulis but 3-5 feet high and branches thicker. Big and smooth Atriplex shrub, canescens group. Salvia sanguinea or Mimulus glutinosa, red. Shrubbery on alluvial bench and slopes is dense. Eremocarpus or Alternanthera. Fences of Fouquieria. Cotton gin.

Santa Ana station, 2,100 feet altitude. Little town of adobe. one-story house below the bench. One Fouquieria in bloom. Now 2,000 feet altitude. Gutierrezia, Larrea brush still dense. Fouquieria in leaf. Forest of Cereus giganteus. Little grass now. White Zinnia. Parryella shrub, may be a Dalea. Aster canescens. White Alternanther. More grass now, bench land away from river now. Villenova, Ambrosia, Megarrhiza, mesquit, palo verde ? Olneya ? Boerhaavia, Cereus giganteus (may be Thurberi), tapers toward tip. Acacia Greggii, two species of annual Bouteloua, flat Euphorbia, Cereus like Engelmanni but shorter. Palo verde, Opuntia frutescens, O. Bigelovii but less spiny. Larrea in bloom, Pectis, Baileya, large species. Much Cylindro-puntia now, Tribulus (brick-colored species), mesquit dense, Opuntia leptocaulis 4-6 feet high. Now on wide plain and mountains far off. Grass a foot high.

Llano station, 2,200 feet altitude. Saw a Cuscuta on Tribulus. Buzzards are coming in now. Some date palms. Thorny Rhamnaceous shrub (not Condalia), Zizyphus ? Acacia, cats claw. Baccharis sergiloides. Hymenoclea, occasional mistletoe on Prosopis, Lippia, few grasses

now, mostly Bouteloua annuals. Lycium, small leaves. Blue flowered Ipomoea. More grass. Allionia imcarnata.

Noria station, 2,350 feet altitude. Still on the plain. Mountains five miles southeast, two mines there. Mesquit, Condalia. Low Hoffmanseggia in fruit. Little Tribulus. Vegetation dense, Mesquit, Olneya, Condalia here and there. Opuntia like Bigelowvii, O. leptocaulis. Cereus (Thurberi), simple stems from point of branching near ground. Euphorbia misera, Hilaria mutica, Cereus like gummosus. Euphorbia, flat species. Erigeron, tall and with purple flowers, annual.

October 26, 1926. On the plains passed over there was much high water the last of September, and everywhere washouts and ground scored. Soil is sandy and reddish mostly. At Queribabi our train stopped, small station with water tank. Many cars, autos, waiting. Waited almost an hour and then hired a boy with a Ford to take me to Carbo, 44 miles, for 20 pesos. Road goes through a fair but bumpy country, winding through the mesquit, and into and out of gulches recently made by the flood, with some heavy sand. Saw vine with red and apple-like fruit climbing over trees (Cardiospermum). Fruit looks like an apple but is bladdery. Also saw for the first time a chimney cleaner Cereus they call viejo (old man) because it has a long and white beard all over, 10-20 feet high. Other Cereus also frequent. No Cereus giganteus. Mesquit and Olneya common, also Condalia. Low shrub with glossy leaves that I called Euphorbia misera; may be a Jatropha. A big and bushy Encelia, like cordifolia is common, also a triangular, long-leaved Franseria. No Fouquieria.

Carbo, 1,500 feet altitude. This had been quite a little town with half a dozen stores and some houses along the track, but half of them had fallen down in the last rain. I botanized some while waiting for the train to pull out the next morning. I found Fouquieria peninsularis common, also a low Cereus a few feet high, and the two Opuntias, also the bottle-brush Cereus once in a while. The green palo verde was in leaf and resembled a Parkinsonia. Cardiospermum was here also. As we passed down toward Hermosillo the ground became flatter, more sandy, and the shrubbery not so thick, but the same species. Everybody was interested in my valise, which was recovered, but few could talk English, and I could not understand much Spanish. The Fouquieria peninsularis is rarely 10 feet high and is now so leafy that it reminds one of Lycium. We now see another Cereus (Thurberi) which has fascicled stems, often is branched twin-like above or with a side branch below, never is half a foot thick. Datura Stramonium, Encelia very common, also Franseria, the long-leaved one, annual Bouteloues forming swards, little other grass, mesquit and palo verde equally common, mesquit has dark and rough bark, the other is smooth and green (the palo verde). Birds scarce, no other animals. Yesterday I saw a jack-rabbit with light ears, white flank and a broad and dark stripe along the back, also a road runner. Bed of river is 100 yards wide and 10 feet deep and no water in it now, on the left. At its flood it must have been at least 10 feet higher than the railroad track, which was here obliterated for over half a mile. We are now

crawling along over the new track, brush all down, flattened down, little pools still here and there in the bed. Skies clear. Rivers must have been at least ¼ mile wide at flood, but no water in it now. Some call this the Piscaya river. There are some oak looking trees, may be olives, 20-40 feet high. 1,300 feet altitude now. Populus Fremonti cultivated. Tall, bushy Cereus common, may be Thurberi. No farming in this region, all cattle and few of them.

Zamora, 900 feet altitude. A few tumbledown houses, no cultivation. Grass mostly all gone. Brush everywhere, mesquit and palo verde, also a thorny airy shrub 10 feet high, may be Zizyphus. Ambrosia psilostachya ? Franseria. Low leguminous shrub, same as I got at Carbo. Tall and tufted bottle-brush Cereus, Datura, Encelia, low Bouteloua, Jatropha ? Blue Ipomoea, white Alternanthera. Palo verde, a Parkinsonia aculeata, white flowered. Acacia, a low shrub with flat pods. Buzzards again. Large Opuntia, Lantana ? Vegetation all a little past. Had a rain lately here. Low Cereus. No cactus area like that at Tucson so far, but Cereus scattered in the brush, almost no flat Opuntias, no Heliomeris today so far. Some flat Euphorbias, Oleander. Populus along creek. Megarrhiza, dates, also Erythea, oranges too. Opuntia Tuna, a narrow one also with acute tip. Large hill on right with many tall Cereus, also bottle-brush Cereus and flat Opuntia like occidentalis. Sorghum Halapense. Oranges starting to turn, no real cultivation of oranges, bamboo, figs, real palo verde, sugar cane. Helianthus annuus, bushes covered with Megarrhiza. Brick-colored Tribulus, devil grass, Baccharis viminea, bamboo in fruit, Aralia cultivated. Xanthium, Populus Fremonti, Agave with long and blue leaves, very old dates. Now at Hermosillo at foot of high hill. Many buzzards. Asclepias subulata. Fleecy clouds and stratus ones, very hot all night, many mosquitoes. The adjoining hill on the south of town is 500 to 1,000 feet high, all marble, being worked for lime now, has been worked considerably in the past. It rises in massive cliffs, but has no ferns. Hermosillo has about the same aridity as Victorville, California, or a little less. It is watered by the Sonora river, whose bed is ¼ miles west and is half filled with very shallow water, sand everywhere else, banks very low. Parkinsonia aculeata grows cultivated along the banks of ditches, is rarely 30 feet high, apple-tree-shaped. There is another species of the same genus, a tall tree, 75 feet high and very slender and straight, cultivated in the streets and parks. There is a big tree. 50 to 60 feet high, with gray bark, fissured lightly in linear areas and has the fig habit, and with large buttresses at base and leaves of Aesculus, 5-6-palmate, it is a Ceiba probably, forms a fine shade, cultivated. In crevices of rocks on the mountain is a little Mamillaria with linear-clavate red fruit about an inch long, and with one central black and crooked spine that resembles M. phellosperma. There is a large and shrubby Opuntia like leptocaulis (which I have so far called frutescens) that seems to grade into our California leptocaulis, and is rather common from Magdalena south. There is a flat Opuntia with long and white primary spines and yellow secondaries, like occidentalis, but rounder in outline. They also grow here a narrow Tuna. The Pitayia Cereus

(Thurberi) is scarce and small on the hill. It has 13 ribs and black spines. No Echinacactus so far. There are two Euphorbias, one is an intricate shrub with small branches, and is 1-3 feet high, with pulp on the stems soft and juicy, hard to break off, liable to peel off from the central wood. This has the same habit as the bigger one with shiny leaves (Jatropha), with yellow and papery bark which has no white sap and is 3-6 feet high, leaves turning yellow, no fruit or flower. This latter I took at first to be E. misera. Then there is a long-leaved Lycium with red berries, 2-3 feet high, also a Zizyphus-like Dalea, and several tender and very slender leguminous shrubs of the Acacia habit, some of them spineless. Saw the black-spined Prosopis pubescens, also saw a few that I think is the screw-bean, but no pods. Encelia cordifolia ? is very common on the hill, also Cassia Covesii ? a shrub with very many stems in a clump, this may be a mallow, both kinds look alike, but the Cassia is here too but less clumsy. There is a flat growing Euphorbia Fendleri ? and two species of narrow leaved ones growing with an oily Pectis. Allionia incarnata is common. Alternanthera lanuginosa is common. There is a Perityle, a shrub, a few inches to two feet high, with yellow and scattered flowers growing in clefts of rocks. Shrubbery dense on the hill. The marble is worn smooth, is granular, and mottled. Saw also in the city two cultivated Echino-cactus.

New Year's mine, 1,150 feet altitude, 20 miles southeast of Hermosillo on the eastern side of a lime mountain. The pitch to the west is 30 45 degrees. Quartz-porphyry on the north of the hill, but the formation is mostly granular lime. Vegetation is about the same as at Hermosillo but with a few new bushes. There is a small tree with white and flaky bark, which they call birch. It has a flat top and few stems, is 20 feet high and grows only on slopes and ridges, and has wand-like branches waving in the wind. It is no doubt Lysiloma candida. Then there is another similar tree but stiffer, but deciduous leaved, and many branches and a pyramid outline that evidently produces shellac, so it must be a Bursera. There are two species of this kind with pinnate leaves and has a round nut or berry. I saw also here Janusia, Lantana, Dalea, flat white Euphorbias, two of them annuals. One herb with pinnate leaves like a Bidens, probably a Cosmos. Near the tannery near Hermosillo grew Wislizenia as an herb about 4 feet high, three species of Bouteloua, one of them hirsuta and scarce, also three annuals, a tall one and a low one among them, also one like curtipendula. Saw one specimen of Fouquieria splendens, also F. peninsularis in full leaf, and in bloom. The three species of Cereus, Thurberi, Pringlei, and bottle-brush, occur, also one that looks like Schottii. The bottle-brush often grows in large clumps, the ribs are 5 to 7, while the other are 13. Vegetation mostly very dense now. A tall Bouteloua annual is frequent, also some Setaria glauca. Wislizenia grows erect and then spreads out into a much branched and rounded top, fruit very small, the plants scattered along the road and on the edges of fields.

October 29, 1926. Rained hard at noon from the west, no wind. Hot before. The birch-like tree is a Parkinsonia aculeata, with the outer

bark yellow and inner bark white, with slender trunk like the birch, but more so, grows sparingly on the hills at Hermosillo, stems tufted. (This must not be confused with Lysiloma). Got a shrub 3-4 feet high, with habit of Lycium, having white and translucent berries like the mistletoe, but with a single black flattish and reniform seed. Pulp juicy, berry ¼ inch wide, seed 2 mm. long, is thorny, bark gray and smoothish, about as in Amelanchier. Got it on the marble hill. Got an annual Perityle there. At this point I lost my notebook.

October 30, 1926. The tree they call Ceiba has 7 leaflets. There is another tree, cultivated, in the park, 75 feet high, deciduous, with very many fine twigs, apple-like top, bark like hard Maple, leaves simple, they call it pioche. The tall Parkinsonia-like tree that I spoke of above as being cultivated in the park is Casuirina distyla, a native of Australia. There is an arbor vitae in the park, Mexican cedar ? The Ceiba has bark like the palo verde till about two feet in diaemter at base, then gray and white with fine vertical fissures, a stately tree. Oranges here are pithy but sweet and thin-skinned. I saw some limes also. Oranges just starting to turn. The marble mountain at Hermosillo has porphyry dykes running east and west in it and 50 feet thick, which has marbelized the dolomitic limetsone. This marble weathers into granules about ¼ inch thick, which form the sand. The rocks are much smoothed by wear. The mountain has been quarried much in the past for tombstones, is hard, and in some cases has twisted grain. Vegetation on the mountain is mostly shrubby. The so-called Parkinsonia (Lysiloma) with the yellow outer bark and white inner bark has the bark cracking off like the birch, leaving the white inner bark smooth and with a green pulp underneath, then very compact and hard and heavy white wood. It grows scatteringly in the crevices. It is the same one described from Diller's mine, 20 miles out, 20 feet high, with flat top, and with several slender strict branches, has a very graceful and airy appearance, waving in the wind. Then there is a low and cordate-leaved shrub, 3-6 feet high, with the same kind of bark (Jatropha). Its leaves turn yellow with age, no flowers or fruit, looks like a Euphorbiaceous plant but sap not milky. It is a graceful plant with many stems. Beneath the inner bark is a very soft pulp which goes deep, but the center of stem is shreddy and does not break off readily, but the pulp peals off. The old stems are very soft. This is everywhere, giving character to the landscape. There is a mesquit-like shrub (same as I got at Manzanillo in 1893, Mimosa) with big and gladiate stipular spines inflated and occupied by stinging ants, much branched and spiny. The true mesquit is also there, and also the palo verde. There is a prickly and densely branched shrub with the habit of a Lycium, referred to above, but is not a Lycium. There is a true Lycium, 2-3 feet high, with long, flat and shiny leaves. It is spiny. Then there is the tall Cereus Pringlei, and apparently a few gigantea, also Thurberi, and the bottle-brush. There is a Mamillaria-like Goodridgii, a flat Opuntia with long white spines, 2-4 inches long and with rounded joints. There is O. leptocaulis, and another similar one twice as high with bush habit and with smooth and larger fruit. There is also the straight Cereus

Emoryi ? but very rare. I also saw a Passiflora at the mine, also a Lantana, a cucurbit vine, Janusia, Dalea with very fine (slender) stems, Allonia incarnata, 3 species of Boerhaavia, Boutelous 3 species, B. hirsuta, Setaria glauca, devil-grass, Ambrosia psilostachya ? Amaranthus fimbriatus.

Santa Rosalia. There is a copper smelter of 1,000 tons a day. The ore is a carbonate in Tertiary conglomerate, beach formation, and for this reason is very recent in origin. They have made an artificial harbor of concrete. There is a long whale-back, ten miles long and several miles wide, of sedimentary and sandy clays that arises on the east side of volcanic peaks, or a range, which I assume is a part of the San Pedro Martirs. Vegetation is about the same as at Victorville, California. Fouquieria peninsularis, Larrea, Jatropha shrub. Porophyllum 2 species. Bigelovia species but with 4-angled fruit, with pubescent leaves, 4-6 feet high, Petalonyx 2 feet high, Mesquit. Encelia farinosa, two species of Euphorbia, Croton Boerhaavia annual. Saw no Boutelouas. Setaria glauca occurs here. Saw three pelicans, one with white head and neck and blue body, one gray all over, one nearly black. A jumping fish about a foot long. Saw two porpoises at Guaymas.

November 5, 1926, Muleje. The landing has one house, and a light-house up on a rock. The town is three miles up the creek to the south. It is a little land-locked bay. Dates grow close by at a ranch, Spirostachys, a 4-angled fruited shrub on the beach, Encelia fainora, a Cereus, long and straggling on the ground on the rocks. Also a prolifera Opuntia. Below Santa Rosalia the first stop was at a penal colony on an island where there was interesting vegetation, a pile landing. Then in the night we came to Muleje. Very, very dry here. Saw bottle-brush Cereus, Encelia very common, Fouquieria peninsularis or splendens, can't be sure. They were cultivating a tree cotton. Saw a few Cereus Pringlei, a Perityle like a chrysanthemum (probably a Hoffmeisteria), a Porophyllum shrub, Begelovia same as Santa Rosalia. Saw an opposite-leaves shrub in the water for the first time (Rhizophorus Mangle). Saw a thick leaved Lycium, also a perennial Salicornia on flats, a Datura Stramonnium, very prickly.

Morning, on waking we are passing a low area, valleys, with hills farther back. Then this area drops down into a plain which goes back to some lofty mountains, 5,000 feet more or less high, running parallel with the coast but some ten miles back. There seems to be a wide tract or valley butting on to the mountains, which are sedimentary and palaeozoic, may be Cretaceous. Then comes a sharp escarpment 1,000 to 2,000 feet altitude on the coast, mostly sedimentary, but the main range continues south. The costal area breaks away into a mesa or low hills. Then comes a large island on the east. Then Loreto lies ahead ten miles more or less. Vegetation scattered on the hills but denser on the plains. The giant cactus (Cereus Pringlei) is thickly covering the plain. There are no other trees. There are jagged mountains on the mainland, being a little to the northwest, but all stratfied nearly horizontally. There is an island about 20 miles long to the east and we pass between it and the mainland as night falls.

In the morning the coast line now is a long series of mesas, 1,000 feet more or less above the sea, Tertiary or Cretaceous. The slopes nearly vertical on the east, few jagged peaks, probably dip gently westward as far as the eye can reach, apparently a great plain behind. As we go southward the mountains drop lower and lower till they almost fade into a plain west of La Paz.

At La Paz Washingtonia Sonorae grows at tidewater along the beach. The bay shallows out to a low and sandy beach or water line for many miles northwest of La Paz. There is also a long and sandy spit north of La Paz, covered with Mangle. South of La Paz the hills begin at once in sloping mesas, like those on the island north (Espiritu Santo) and seem to be Triassic or Cretaceous. Then behind them come steeper volcanic hills or mountains, as though they had shoved up the sedimentaries between them and the sea. Along the beach there is a series of Pleistocene benches next the shore which are about 100 feet thick, or less, and in places full of shells. To the south of La Paz soem 30 miles rise higher mountains with mines which are at least in part eruptive. Cactus are very common, both Cereus Pringlei and Thurberi. The brush is abundant, mesquit, Lycium, Euphorbiaceous stuff, Bigelovia (same as Santa Rosalia). There is a long and coarse vine with big leaves and pink flowers, from a woody root, along the seashore, sometimes 20 to 30 feet long, growing flat on the ground and climbing over bushes but with no tendrils. Mesquit is common, also the same Lycium. A giant Cereus which must be Pringlei is common here, also the proliferous Opuntia, also Cereus gummosus and another like it, but larger and more erect. Mollugo, Pectis, Eragrostis, a bush with panicled flowers and white and translucent berry, very small flowers, with habit of Chilopsis, a palo verde same as at Hermosillo.

Triunfo. This place is about 40 miles south of La Paz and up in the hills near the top, 1,300 feet altitude. a great mining town in the past with an old smelter of great size. Here the vegetation is denser than below because of greater humidity.

San Antonio. This mining town is about five miles farther south and on the southern slope (going down toward the sea). November 9, 1926, 1,200 feet altitude. Lysiloma candida is very common here, Fouquieeria peninsularis, bottle-brush Cereus, also Cereus Pringlei, which is the largest of the cacti. This cactus is at once separable from C. giganteus and all other species by the flowers which come out mostly on the southern side of the stems, are 3-4 inches long, and very dark (almost black) purple on the outside, and pearly white within when open, and by the great burr formed by the mature ovary, which on the outside is a densely tangled mass of yellow spines which remains on the fruit. The Cereus Thurberi flowers I did not see, but the fruit is smooth, 2-3 inches in diameter, with red and juicy pulp and with remote and small black seeds, and is edible. Also there is the shellac tree (Bursera) with yellow bark flaking up, also the other species with pinnate leaves. Rhamnus California ? (Karwinskia) sometimes gets 15 feet high and with trunk 6 inches thick, with dark and rough bark. Lysiloma has smooth and

white bark almost the color of the aspen and glaucous, corymbose tops. The humidity must be high here, but soil is dry. Here grows Cardiospermum Halicacabum, have seen no Larrea. There is a prickly and erect shrub like Cerocarpus but leaves thin (Capparis ?). There is a yellow-spined flat Opuntia. I saw one narrow-leaved Agave (Goldmanni ?) on the other slope. There are two species of Yucca, one 2-10 feet high, with sessilinflorescence (probably australis). One is caespitose and fruit stalks 2-3 feet long, green leaves, no threads, much like Mohavensis but shorter. This was on the other slope too.

Near Triunfo. Vegetation much taller than at San Antonio. Now a place of 500 people more or less, but mine shut down. Agave Goldmanni ? with very slender stems 15 feet high by an inch wide, with racemes of few bunches of glaucous flowers. Leaves 14-30 inches long, 2-5 inches wide, with sharp black spines and an inch apart, on the margins are small and black calluses representing prickles, leaves dark-green and smooth, caespitose plants, growing about eight miles south of La Paz among the brush. There is a Prosopis-like shrub (Pithecollobium) with short and wide black pods. Nicotiana glauca, N. trigonophylla, Ambrosia (Franseria Ambrosioides), also the long-leaved shrub I called Franseria north of Hermosillo, which is an Encelia or Vigueria. Mangle on the spit but not on the mainland. There are the following Cereus, the big cardon, Pringlei branched below the middle, with 15 ribs, no fruit, then an intermediate species with few branches and a very budd-like fruit, reminds one of very big chestnut burrs, then there is the usual 13-ribbed species. There is also a caespitose and very low Cereus after the Engelmanni kind. All the above on November 13, 1926.

November 15, 1926, La Paz. Cultivated bush cotton, Gossypium Barbadense grows near hotel, and is perennial at least, also Tamarix, the feathery species (Italica). Tamarindus cultivated. Huamuchila, Pithecollobium boreale, sugar cane, the Climbing Asparagus, cultivated peppers, chili, tomatoes, beans, lettuce, sweet potatoes, dates, grapes, cocoanuts, roses, chrysanthemums, Zinnias, Helianthus annuus, Agave vexans in flower, Casuarina. Agave vexans has glaucous flowers, 3-10 in a cluster, perianth bell-shaped below and united half an inch up, then segements linear-acuminate and about ½ inch long, greenish or whitish, erect. Antheres light-chestnut, 1 inch long by 2 mm. wide, versatile, obtuse, straight, filaments, 3 times as long as peranth, purplish above as is the style and rounded stigma. Pedicels as long as wide, 2 mm. long, rarely 4 mm. long, pods elliptical and not at all contracted in middle when mature. There is a Cucurbit vine hanging from the low trees 10 feet high with oval, hollow red fruit, but when green is spotted green, climbing over a Bursera. There is a Porophyllum shrub, very slender and with filiform stems, 10 feet high, growing up among the brush. Lantana, an open shrub with habit of a labiate. Porophyllum has a strong odor. Examining the various Cardon cactus (Cereus Pringlei) I find the ribs vary from 11 to 13.

November 16-17, 1926. Had a high north wind for two days and nights. The cotton bush that grows here is about 5 feet high and widely

branched above. Today very hot and still. Boat due for Mazatlan today. There is here a Cereus like Emoryi, the same hight, but twice as slender, with yellow spines. There is another low one growing in mats, 1-2 feet diameter, the stems are 4-6 inches long. This is a Mamillaria probably. The big-burred pitayia, cardon (Cereus Pringlei) has intermediate forms that are smaller. The proliferous Opuntia is common, its fruit is almost always smooth and shiny. Then there is another, Tuna-like (cultivated), with joints about a foot long and nearly as wide, with each aureole with stout spines, probably fruit is edible. The real pitayia (of the Mexicans) is a low Cereus, that is, rarely over 8 feet high, with slender stems, more more of the habit of C. Schottii, but fruit is globular, shiny all over, about 2 inches wide, red, a little depressed-globular, but the fruit I ate at San Antonio ovel and 3-4 inches long, dark-purple, and with black seeds ½ mm. long, four times as small as those of the burr-cardon (Cereus Pringlei). Some Mexicans say there is a big cardon with yellow and smooth fruit that stock eat. Saw a few Echinocacti (Falconeri ?). There is a big forest of the Cardon at the salt works at Pechilingue bay. The formation on the east of La Paz is tilted gently 10-15 degrees to the west, apparently close to the sea is seemingly Pleistocene, but above that eastward (below it geologically) is a black and reddish sandstone in immense areas like the Trias of Utah and may be Cretaceous, beyond that east are the high eruptive mountains, basaltic probably. The vegetation on the hills is little denser than at Tucson or Victorville, no grass. The higest mountains seem to have no more vegetation on them or, if any, a little less than below.

Left La Paz on the Washington for Mazatlan, and sailed all night over a placid sea. The purser says it is 220 miles across and that we will get there at night. Have seen a few birds, but no fish or whales. Now out of sight of land. Boat is making 10 miles an hour, am not seasick. Day mild and with few fleecy clouds.

Monday on train bound home out of Mazatlan. Forest still. Saw an Agave Goldmanni. Now I see a red parasite (Loranthus) on a Bursera, long flowers. Trees covered with Rochella lichen. Oceans of Leguminosate. Big apple-tree like Bursera but with simple leaves. Nowa tree 20 feet high with big and white flowers like a Cornus (Bombax Palmeri ?). Now a small petayia with 4 ribs. Now a bush (Leguminous) with long and yellow and erect spikes. Now a lax-leaved Yucca. Now we are down to tidewater. Dinner, quite a place. There are three ranges of mountains parallel to the east of us, 2,000 to 3,000 feet high, and a river 50 feet wide. Amarantus fimbriatus. Now a leguminous shrub with long and flat branches like a cocoanut leaf. Ipomoea purpurea. Now a tall weed like a Villanova. Now a tall and white-barked leguminous like a palo verde and with long and narrow pods. Now a big Aristida-like grass. Cardons still, 20-40 feet high. Now white and purple water lilies. Also Alisma or the like, Cuscuta, Hymenoclea. Vegetation large. Big leaves Leguminous plant with pods. Now an Agave near Vexans. Cypress with trunk 4-6 feet high. Purple water lily, Alisma. Some signs of rain. Yellow flowered small tree. Thou-

sands of crows. Now close to sea again. Baccharis viminea, erect Cereus 4-6 feet high with round stems and 6-8 ribs. Red flowered plant like an Asclepias subulata. Vegetation 10-15 feet high. Again the Cornus-like shrub. An Agave 20 feet high with leaves 3 feet long. Now a smooth and shiny Opuntia Tuna ? but joints 4-6 inches long. Lysiloma again, Olneya ? Now a river 150 feet across. Town of 1,000 people more or less. Cardon with burr-like fruit. Now I see a tall and white-barked almost leafless tree with the big and single white flowers (Bombax ?). Now the long-leaves Encelia. Much grass, recent rain. Vegetation dense, 10-15 feet high, 2 species of Cardon, one more slender and candelabrum-like (Thurberi). Conical hills, now a big-podded tree. Very much grass, 2 feet high. Close to sea. Many trees leafless. Ambrosia, no Fouquieria yet. Now an Echinocactus with few ribs, 2 feet high. Now an occasional Fouquieria peninsularis. Higher mountains to the east, Mile 298. Ambrosia very common now (this is probably Franseria ambrosioides), 3 feet high. Euphorbia flat on ground. A grass like Paspalum.

Francisco station. Brush 10 feet high, flat region on west. Many Leguminosae, but smaller. Cloudy. No Opuntias, Agave vexans. Everything in fruit. The slender Cereus (Thurberi) has a tapering tip, Pringlei is blunt at tip. Opuntia prolifera Echinocactus 2 species. Phoradendron on Leguminosae. Parkinsonia aculeata, gray-barked parasite is near Tillandsia, cardon. Vegetation is now 20 feet high. Long and high mountains 20-30 miles east, nearly parallel with us. Parkinsonia aculeata still, gray moss, mud hens. Smooth Opuntia 10 feet high. Very dark-green tree with apple top, Olneya ? or Capparis ? Clematis. Ceiba trees 30-40 feet high. Buzzards. Grapes. Yellow-spiked bush again 10-15 feet high.

Arroyo Chiquirita, Baccharis, cocoanuts, Franseria-leaved Encelia, Hymenoclea. Much cardon. Vegetation still 20 feet high. Lysiloma very common. Short-podded Cassia, 2-3 inches long pod and small flowers. Malvaceous bush 3-4 feet high. Water dirty as though it had rained recently. Corn 6 feet high, dry. Cardon. Above San Blas Sinaloa. Much wood, mesquit. Low region, with low and distant mountains, much ground visible among the vegetation, more like at Victorville but denser. Cardon like the burred one (Pringlei) but more slender. Leguminosae everywhere. No Fouquieria. Gray-barked shrub like Lysiloma but not it, palo verde, much Cereus Thurberi, some Pringlei, Dogwood tree (Bombax). Eupatorium 3 feet high. Grass less abundant. Kilometer 251, tapering cardon (Thurberi) everywhere. Bursera rare, Fouquieria more common, no true mesquit. Small Pedilanthus, flat Opuntia, like at Mazatlan, Echinocactus common. Vegetation 10-15 feet high now, Cylindropuntia very common. There is a tapering Cereus with very spiny burr. Mesquit, Cardon has a spherical burr, not the same as at La Paz (Pringlei). Corn, soil fine. Foggy. Shiny green and spiny flat Opuntias, also the leptocaulis species but 4-6 feet high, also the low petaiya. Kilometer 241. Yaqui station ? There is a tank here. Bottle-brush Cereus, palo verde, very much Cylindropuntias, also a flat one. No grass. Soil fine, flat country to the north and west. Cereus Pringlei has

a yellow-spined burr. Vegetation 10 feet high.

Masiaca station, a little place, some grass, mountains to the east, 2,000 to 3,000 feet high, 10 miles more or less. Mistletoe, Pedilanthus, mesquit. Vegetation 15 feet high. Fouquieria, much grass, big cardon with about 9 ribs, white-barked Luguminous tree. Cereus Thurberi is about 15-ribbed apparently here. Vines. Much flat Opuntias, also the Cylindopuntias. Fouquieria peninsularis very common, little grass| Mesquit very common, Cylindropuntias 2 species, one a slender one.. Vegetation 8 feet high. Much cylindopuntia, Bursera with smooth and dark and birch-like bark. Olneya. The big cardon (Pringlei) has flowers 3 inches long, no slender tube as in the petaiyas. Smooth and spineless Opuntia. Sea not far off to the west. Leguminous tree 1-2 feet diameter and 15-20 feet high, gray bark, not checked, not a Leguminous tree but a Capparis, evergreen, palo verde. Cereus Thurberi has 11-14 ribs, the small species has 5 ribs.

Bacavechi station. Small adobes. Many Leguminosae still. Asclepias subulata, long-leaved Encelia still common. Many farms, good soil, no irrigation, half of farms uncultivated. Amaranthus fimbriatus very common, Zizyphus, bottle-brush, cactus, much Cylindropuntia, much palo verde. Echinocactus with twisted ribs often leafless Bursera. Fouquieria bark very green to base, flakes up some. Vegetation very dry, all flat region. Kilometer 209, Mimosa. Good roads. Vegetation 8-10 feet high, mostly mesquit. Some palo verde, a few cactus. Much Boerhavia, also flat Euphorbias.

Navajoa, a big town, kilometer about 198. Mountains in the far east. Yaqui river 100 feet wide, ferrying an auto across. Corn fields, dates, bamboo, Tamarindus, Cleome Sonorae, Nicotana glauca, Baccharis viminea, flat and spineless. Opuntia, 2 species of Cardon, Cylindropuntia, Olneya, catsclaw of La Paz, vines. Vast and flat country. Fouquieria 4-6 feet high. Many Leguminosae. Grass. Now flat and Cylindropuntias like leptocaulis. Echinocactus with acutish tip, also Emoryi ? Cereus occasional. Now much Cylindropuntia with spines not yellow. Yellow-bark Bursera, leafless now. Many Leguminosae, very dry, much dry grass, Cardons scarce. Franseria ambrosioides, palo verde, mistletoe on Leguminosae. Vegetation 10 feet high and ground visible everywhere now, Bouteloua annuals and hirsuta, Ambrosia like Franseria, Krameria, Calliandra.

Cajeme, a large city in the flat region. Mostly mud houses but many fine places. Autos of many kinds. Low mountains to the north, volcanic Encelia, farinosa, Franseria ambrosioides very common, little of Cylindropuntias. A low species of Cereus 3-5 ribbed. Thurberi is scarce and singly and 3-6 feet high. Bottle-brush Cereus, Opuntia leptocaulis. Brush is all low now, 6-8 feet high. Agave Americana cultivated. Mountains near now on the east and low, cattle.

Esperanza station. Probably 500 people at the station, some soldiers, one with sandals. Quite a town of low huts. Low mesa-like hills 1,000 feet more or less high to the northwest and on the east. Corn. Here we take on a car of soldiers. Cucumber vine with spiny fruit and red on bushes, fruit 3 inches by 2, pointed, dry and not densely prickly, appar-

ently the same as grows at Mazatlan. Brush 15 feet high now, many vines (Cardiospermum ?), mesquit, Condalia. Big canal 30 feet wide, another vine with small leaves, not a Clematis, forming a blanket on bushes. Two cars of soldiers now in front, in steel flat cars. Alternanthera lanuginosa. Now a river with water 50 feet wide and bed 300 yards wide, acres of dense bushes 15 feet high, somewhat like Phragmites. Hymenoclea, cottonwoods (Fremonti ?). Good botanical region now. Cereus Thurberi. We probably have 300 soldiers on train now, three cars full and a lot on top. This is the Yaqui country now. Now a little town and a little fort on a hill. Much Encelia, Bursera, Cereus Pringlei, Mistletoe. Cereus Pringlei in flower. Brush 15 feet high. No Fouquieria for a long time. No Agaves. Aristida, a tall grass, Amarantus fimbriatus.

106 kilometers. Much Cylindropuntia 2 species, much like leptocaulis but large. Region is all flat to the southwest. Brush mostly 6 feet high now, scattered Cereus Pringlei, mostly low mesquit, flat Euphorbias now, still flat region on all sides. Low mountain off to the right (east). Now much Cereus Pringlei and Thurberi, Eragostis pilosa.

Bacam. Bottle-brush, much Cylindropuntia of 2 species, Olneya, Cucurbita, vine, Cereus Pringlei, Carphephorus junceus. Brush 15 feet high. Primitive soldier camp. Now a gigantic Cereus Pringlei, probably not giganteus, has more ribs.

Kilometer 89. Much big cardon. Basaltic mountains on the right close in.

Lencho station. Soldier camp here. Huts thatched with long grass. Station burnt. Fort of flat adobes close by. Big cardon most common now, with many wood-peckers. Brush 15 feet high up to 20 feet.

Vines. Seen no dog-wood tree for a long time (Bombax), Carphephorus junceus, bottle-brush, big cardon gone now. Long leaved Encelia, Buddleia or Hyptis, much low bottle-brush cactus 6-8 feet high, also a straggling Cereus. Many Leguminosae still, Cereus Thurberi still, now some of the big cardon, 2 species of Cylindropuntias.

Vicam. This is the capitol of the Yaqui region. A soldier camp too. the camp of the Yaquis along the track was burnt a year ago, soldier block house with a log parapet on the top.

We are now at the next stop north. Off the road to the west is another Yaqui town. Here is another soldier camp. They are putting up two circular adobe block houses here. In a dry wash I see an Echinodorus. Now a very slender leguminous plant, annual. Portulaca.

Kilometer 53. Andropogon saccharoides, 2 species of Cylindropuntia, a flat Opuntia, Parkinsonia aculeata, much grass. Country flat, brush low and scattered.

Kilometer 49. Rifle pits. All cactus present but Cereus Pringlei, Alternanther lanuginosa, Jatropha canscens, Atriplex canescens.

Another army camp with rifle pits 300 ya[illegible] Shrubby Suaeda. Brush low, 10 feet more or less high. B[illegible]charis viminea. Soldiers patrolling track. Setaria glauca, A[illegible]haroid[illegible] Soil rather alkaline now. Big cardon.

Kilometer 41. All cacti present, Agave vexans.

Peon, another army camp, circular rifle trench around station, full of houses or rather huts 4-6 feet high. Bigelovia, Amarantus fimbriatus, Cardiospermum. All cacti still, Aplopappus gracilis, Erigeron like flagellaris but taller, Cyperus. A woolly long grass spike, Muhlenbergia debilis, Bouteloua annual. Now among volcanic hills, a long-spiked Sporobolus, Prosopis Atriplex, cardons, bottle-brush, Franseria ambrosioides, now some big cardons. Brush 10 feet high. Big cardons common now. Black basalt on the west. Larrea common.

Kilometer 25. Now at a village where Yaquis years ago massacred a whole train load of people. Crosses mark the place. A windmill and cottonwoods.

Piedra. Kilometer 23. Now a low, blue, and round flat Opuntia, shiny. Now lava in tiers. Rifle pits. Tribulus, Argythamnia, Sida, Physalis, Cleome Sonorae ? Larrea everywhere, big cardon.

Ortiz. November 23, 1926. Just saw a dog walking on two feet, one front, one back. Soldiers still on train. This is a camp with many soldiers. Cloudy and cool. Dates. Saw some helmet hats. Houses mostly with bamboo rods and dirt roofs and floors and mostly one room. Tables of boards and oil cloth. Most of the women with stockings and shoes. The soldier camp is on the edge of the town. Asclepias subulata, Encelia cordifolia, Argemone Mexicana, Nicotiana trigonophylla, Pectis angustifolia ? Allionia incarnata. Long-leaved Encelia, Carphephorus junceus, a shrub with flat and reddish pod like a Prosopis, palo verde, also Parkinsonia aculeata, Hymenoclea, mesquit, Cardiospermum, Hyptis Emoryi, bottle-brush cactus, Martynia, slender catsclaw (Mimosa). Ipomoea, Jatropha canescens, Cylindropuntia but fruit larger than usual. Saw a hawk with a white collar. Capparis. Bursera with yellow bark. Now the Sonora river. Cereus Thurberi, Pringlei probably, also Olneya, Cardiospermum, mistletoe. Brush now 2-6 feet high. Much low Acacia, palo verde. No grass. Later some grass. Bursera, Olneya, Encelia cordifalia. Much Fouquieria, Franseria ambrosioides.

Moreno. Ipomoea with blue flowers and small leaves, Martynia shrubby and not dense, Cardiospermum, 2 species of Cylindropuntia, mesquit. No Larrea, palo verde, Bursera. Agave vexans. Low hills with Lysiloma on the sides. Amarantus fimbriatus. Ranges of mountains on both sides now, 10-15 miles off. Brush 10 feet high. Much less cactus. Low hill on east with palo blanco (Lysiloma). Much grass, mesquit, palo verde, Zizyphus, bottle-brush.

Tores station, 26 miles from Hermosillo. Argemone Mexicana. Limestone hill on the west. Philibertia, bottle-brush with 5 ribs, Cereus Thurberi, Olneya. Little grass. Encelia cordifolia. More grass. Shrubbery 10-15 feet high, bottle-brush grows in tufts. Now low and conical hills all around in the distance. Typha angustifolia, Bamboo, Cenchrus tribuloides, long-leaved Encelia. Sorgum Halapense, Bamboo. A low and spreading bush or herb with heads of yellow flowers, and fruit with wings wider than in Abronia. Xanthium strumarium, sugar cane, Physalis, Big Tuna, yellow oranges, Clematis, small leaved Rumex, dates.

Parkinsonia aculeata. There is a limestone hill all covered with Cereus Thurberi bottle-brush, Wislizenia Cardiospermum, Hymenoclea, Encelia cordifolia, very much long-leaved Encelia, Zizyphus, mesquit, Olneya, catsclaw. Very dry here. Large Cylindropuntia, Allionia, incarnata, Hilaria mutica, low and very narrow leaved Bouteloua, Jatropha canescens.

Pesquiera station. Scattered Leguminosae, Encelia cordifolia very common, catsclaw, Opuntia leptocaulis, long-leaved Encelia, bottle-brush, another low Cereus like maritimus, Cereus Thurberi, Olneya, Prosopis, Philbertia linearis, Franseria ambrosioides. Country has been washed with water at least 10 feet deep, Allionia incarnata, Amarantus fimbriatus. Brush now 20 feet high, Capparis, palo verde, Lycium, screw bean, Hymenoclea. River here was ¼ mile wide at flood. Datura Stramonium, Alternanthera languinosa, Zizyphus, bottle-brush, Condalia, catsclaw, screw bean. Mistletoe, Cereus Thurberi becoming rare, also Fouquieria. Much grass Bursera with brown bark, 2 species of Encelia. Opuntia Bigelovii, Cereus maritimus ? Zizyphus, Cardiospermum, Condalia 15 feet high. Boerhaavia annual, blue Ipomoea, Castor oil plant. No mountains near. Oleander, Nicotiana trigonophylla, Villanova chrysanthemoides.

Carbo. Alternanthera lanuginosa and Encelia cordifolia most common now. Hymenoclea. Whole valley nearly level, vegetation rather dense and 20 feet high. Mostly Leguminosae, Baccharis, sergilioides, Wislizenia. Populus Fremonti.

Pozo. Everywhere here the housese are collapsed. Some canes of Fouquieria splendens on a fence, Baccharis sergiloides, Lycium, Hymenoclea in long spikes, Physalis, flat Euphorbias, big flat Tribulus, Ipomoea pink-blue, medium sized. Mistletoe, Amarantus fimbriatus, Franseria ambosiodes, Cereus giganteus ? Cottea, Bouteloua prostrata, Aristida gracilis ? Malva, Setaria gluca. No Larrea, palo verde. Vegetation very green.

Camon. Everything as dry as a chip.

North from Magdalena, November 24, 1926. Sambucus glauca in bloom, a tree 20 feet high here. Celtis, Mesquit, some trees 40 feet high and 2 feet diameter, Juglans, Populis Fremonto, Hymenoclea, Krameria. Baccharis sergilioides, Salix amygdaloides, Zizyphus, Atriplex canescens, Cotton.

Nogales, January 23, 1927. Saw Yucca elata ? on the way from Tucson. It has the habit of Whipplei, but has a trunk 4-6 feet high. Leaves more like those of Y. angustissima but wider. Inflorenscence that of Whipplei. Flower peduncle 2-4 feet long.

January 24, 1927. Frost on the ties and car tops at 7 a.m. Barometer reads 3,600 feet altitude. The divide south reads 3,900 feet. Nearly all the way south over the divide from Nogales we are among live oaks (a black oak). It is bright and sunny, but frosty. The first stop is 3,500 feet altitude, where there is a broad meadow and small pond. Saw a camp under a live oak, with a bright fire burning, and a wagon near by. Passed a fruit express train of 14 cars bound north at the summit. Much wood piled high, also many burros grazing. No pinons or junipers, some Celtis occidentalis, Juglans Californica with mistletoe, now a decidu-

ous oak ? Now an ash with a mistletoe, Chilopsis, Celtis, live oaks getting less. Second stop, Populus getting red from the male catkins. Still signs of frost on ground, Salix amygdaloides, Trixis in bloom, Platanus. Live oaks went out at about 3,000 feet altitude. Now 2,700 feet altitude. Brush getting green. Sambucus all green. Turtle doves. Populus in full flower. Grain starting. A big mesquit 40 feet high and 2 feet diameter.

Magdalena. Much salix amygdaloides. Flocks of blackbirds. Trixis under the willows. Eucalyptus cultivated. Now crossing a stream of about 10 second feet. Water cress. Big Tuna 10-15 feet high, cultivated. Oranges, olives. Nicotiana glauca. Quince trees. Olive trees loaded. Much cardon (Cereus Pringlei ?) and bottle-brush opposite Magdalena. We now have just passed Magdalena. Trixis angustifolia, Sambucus is really an evergreen. Have not seen Larrea yet but the flora is Tropical. Bananas and figs. Castor oil bushes. Peas in bloom, Ash (Fraxinus) in bloom. Helianthus annuus 10 feet high.

Lorazo, a little station. Larrea. Santana station. Cotton gin. Now a low town by the river on the open plain, Yermo. Quite a town. Low volcanic hills on the west.

Loria station. Low mountains on the west, mines. Brush scattered, much grass.

Carbo. Grain six inches high, long-leaved Encelia, Sphaeralcea angustifolia in bloom. Encelia cordifolia in bloom. Here is where we see the first Fouquieria peninsularis. F. splendens is common from the north to Magdalena. Bursera (copal) here.

Hermosillo. Saw the first big dogwood flowered tree about 20 miles north of here. Wheat in head here. They have had some rain lately.

3 p.m. Kilometer 280, south of Nogales. Warm and dry. Populus leaves still partly on.

Guaymas. Botanized on the hills north today (January 25, 1927). Vegetation very dry. Got very little. Still and warm.

Guaymas, January 26, 1927. Hired a launch to take me over to the mouth of the bay. Got many plants there on the islands. Giant cardon (Cereus Pringlei) in a forest on the east end of island near mouth. Saw four masses of them on the north end of the island, where the navy yard is. Saw no ferns. The Cereus Thurberi is larger here. The flowers of C. Pringlei are short and not much expanded. The form on the island has branches near the base or even often at the base. Saw also several Echinocactus with yellow and smooth fruit and no wool, with spines but little flattened and straight or hooked, plants 2-6 feet high, a foot or more thick, ribs not spiral, has no small lateral spines to speak of. There is also a Mamillaria here, common, and is rarely 6 inches high.

Near Vicam, January 27, 1927. Cerus Pringlei varies considerably, and some forms appear to resemble C. giganteus somewhat, but the two can always be separated by the greenish-white flowers and smooth pods of giganteus, and the black-purple flowers and great burrs of fruit of Pringlei.

Oroz station. Here they are erecting a square fort with circular

block house, 10 feet high on the corners. Cereus Thurberi, much mesquit. There is one plastered house here, and two tie houses with two soldiers on top, one oblong fort made of adobes with arched corners and salients, brush cut o... around. One woman smoking. Physalis lobata covering the ground and making it seem blue from the many flowers. Encelia frutescens ? Opuntia prolifera, also shiny one like leptocaulis but thick. Tall Lantana, Cereus giganteus ? C. Pringlei, C. Thurberi.

Another soldier camp. The soldiers are armed with our old U. S. army Springfield rifles or their successor, the bolt rifle. Houses covered with grass thatch and then two inches of mud. One small round block house going up. Much Franseria ambrosioides. Mimosa in bloom and with strong odor. Cactus scattered now.

Cajeme. More flowers. Nights at Guaymas were cold. Mistletoe on Leguminosae. Eleveation only a little above the sea. Barometer reads 600 feet. Humidity 63%. Brush scanty, 4-6 feet high. Much grass. Low volcanic hills near at the east. Some Lysiloma candida on crests. Now past the hills on a vast plain. Brush 10 feet high. Big plantation of Agaves on the right.

Vilderrain station. Still flat country and brush scattered.

Fundicion station. A few houses. Ground purple with Physalis. Legumniosae 10 feet high, and a little thicker on ground, mostly mesquit and Mimosa. No Larrea. Cereus Pringlei frequent, also Thurberi. Patches of Opuntia prolifera species, some straggling petaiyas. Prosopis ( ) with tufted and slender stems 20 feet high and mottled-gray bark and common. No Bursera, no Fouquieria. Leguminous shrub with short and broad pods and leaves like Eriodictyon tomentosum, 20 feet high.

Navahoa. Big river here, 150 feet wide. Dates. Cottonwoods. Tomatoes a foot high. Tamarinds, castor oil plants, grass on the hills a foot high. Mountains some 15 miles to the east, two ranges. Brick kiln, factory. Big town. Residence of Obregon. 3 p.m. Getting warm. Devil grass green on ground. 1,200 feet altitude. Children with pails of peas. Fouquieria peninsularis again, along with much cactus, but no Cereus giganteus. No main trunk to Fouquieria here, but stems twisted as in this species. Only one tree species scattered over the plain; this seems to be a Capparis. Saw an Agave vexans. High mountains 30-50 miles eastward. Palo verde. More ranches. Nicotiana glauca. Long-leaved Encelia.

Masiaca station. Vegetation 15 feet high, mostly Leguminosae. Much Cereus Pringlei and Thurberi, no C. giganteus, Fouquieria. Ranch. Peas a foot and a half high in bloom. Still flat region. Bursera leafless still. Tufted Prosopis (?).

Luis station. Still in the flat region but more rolling. Much Cereus Pringlei Cornel-tree, leafless but common now (this is Bombax). Brush 15-20 feet high. Opuntia prolifera species. Echinocactus. Just saw a magnificent red-flowered tree in full bloom and becoming frequent as we move south. Bigger trees now, whole tree a mass of red or purple like Bouganivillia.

San Blas Sinaloa. January 28. Went out and got a big collection

of flowers; filled every drier and 25 over. Next day went about two miles west along the railroad track to the big mountain on the left but did not climb it, because I already had big bundle of flowers. Shoes hurt me very much. Got two species of Lantana, bushes 4-6 feet high. Got the Bombax tree with white flowers. Got also a brilliant-purple-flowered tree, a Bombax (?). Got two Mamillarias, also saw a tufted low Cereus like that at La Paz. Took a photo of Echinocactus Falconeri. This has a flat and hooked central spine, and rather capillary twisted secondary ones. Few ribs and no wool. Fruit almost the same as in acanthodes, greenish-yellow, 2 inches long by an inch wide, full of black seeds. Sepals and petals rigid and dry. The purple flowered tree has smooth and gray bark, like a fig, few straggling branches ending in a cluster of flowers. Has the habit of a Catalpa. Is about the same kind of tree as the cornel-like one, but the branches of that are more slender and more numerous. Tree is 20-30 feet high. Saw the Agave, the same as at Hermosillo, hanging from cliffs and common there, no flowers. Agave here also. Asclepias like incarnata in a dry pond. Populus dimorpha Brandegee. There seemed to be another species here but not sure of it. There were many termite ant hills here in the brush. Saw an army of ants about a quarter of a mile long and 4 inches wide, all carrying Marsilea leaves from the flat into the hill. Many little midges in the air. Saw some grasshoppers, small ones. No frogs nor toads. Much stagnant water and frog-spittle but no other plants in the water. Humidity at 9 a.m. was 75% about every day. Saturation at night. The cardon here (Cereus Pringlei) has 9 ribs, is 30 feet high and 2 feet thick below.

Los Mochis, 30 miles west of San Blas. Saw a white flowered Cornel-like tree with corky spines all over the old trunk, and with long and cucumber-like pods full of cotton, no leaves (Bombax ?). January 30, 1927. Matso & Sons ship 300 to 400 cars of tomatoes and peppers a month from fall to May. They are the biggest shippers. Fruit infected with nail-head fungus, and by puffiness in wet weather. The nail-head fungus is Macrosporium Solani, and develops best in wet weather. Bourdeaux spray checks the fungus. The puffiness seems to be a mechanical condition. Country is flat and 10 miles from the sea. Brush much the same as at San Blas. Town is 16 miles from the sea at Toplobampo Bay.

On train returning from Los Mochis to San Blas. At first no brush, very much flat country with very much grass and cattle. Now low brush, 6 feet high. Leguminosae and Cereus Pringlei 20 feet high, occasional Fouquieria. Now more cactus, bottle-brush Cereus 6-10 feet high. Tillandsia. Much young Franseria ambrosioides, rarely Agave Goldmani. Much Phacelia like Fremonti, Mistletoe on Leguminosae, a little Cereus Thurberi, two species of Bursera. Two Opuntias, one smooth and shiny and oval, the other round. White Lantana. Solanum, prickly bush. Agaves scarce. Some Echinocactus Falconeri. Mimosa, same as at Guaymas. Bursera. Vines. Cornel-tree. White-barked Leguminous shrub and slender. Fouquieria as tall as Cereus Pringlei. Parrots.

February 1, 1927, took tramp northeast to the hills. Got many

shrubs. Saw several Cereus Pringlei with branches nearly a foot in diameter and 15 long, with whiskers on the end. It had some typical flowers.

February 2, went northeast to the mountains. Brush very thick, same in kind as everywhere. Much Cereus Pringlei. Saw a Pedilanthus with thorns clear to the ground climbing over a bush. There were yellow joints full of seed, no flowers. Had long and leafy branches and fine and deciduous black needles. Stem 2 inches in diameter. Cereus Pringlei has most of the flowers on the south side, facing the sun. Northeast of San Blas there are larger masses of trees, 20-30 feet high and with the spines developed into whiskers as in the bottle-brush but spines not so long. No other difference in the plants. Saw some of the Guaymas Mamillaria, also Echinocactus Falconeri. Saw also Cereus Schottii (?) a straggling petaiya which sometimes develops aerial roots. Much Opuntia prolifera species, also the tall leptocaulis species, with fruit triangular in outline, smooth or spiny, with leaves an inch long and very prominent on young shoots, no flowers yet.

February 3, 1927. Botanized on the river. The cottonwood (dimorpha) is a big tree, 75 feet high, with spreading habit of angustifolia but not with the dying old branches so common in that species. Bark is gray and rough as usual in the genus. Male catkins all green, not at all red. Female ones very slender. Leaves on lower shoots inclined to be linear and serrate at first, the later ones are rhombodial and acuminate. Plant is much infested with a parasite. The old leaves fall as the new ones come on. Trees never bare. Scales of first catkins brown. Stamens always yellow.

February 5, 1927. Below Culiacan. Now in oceans of the graceful Lysiloma candida-like shrub with mottled-gray bark, and tree 20 feet high. More flowers out now. Cassia shrub of San Blas common. Cactus rare, but some Cereus Pringlei. Parkinsonia aculeata occurred at San Blas on the bottoms. Sky clear. Very moist. Some cattle. No grass. More Cereus Thurberi. Here is a ditch full of Azolla (?) Rochella lichen on the bushes. Bombax still. Agave Goldmani occasional.

Olate station. Now near the sea. Brush lower, but has been as high as the telegraph poles. Now close to the breakers. Here is a low bottle-brush with 3-5 ribs, also the usual Cereus Schottii. Brush lower. Mangle. Road skirts the sea for miles. White thunder clouds. Mountains east of us now.

Modesto station. Much Argemone alba. Some big trees. A peculiar Rhamnaceous shrub with branches like a frond of a fern, 10-15 feet long. Clematis.

Mazatlan. Everything very dry. Clear and warm. Cocoanuts about ripe.

Now out of Mazatlan going south. Saw on a wet flat what must be Echinodorus. Shrubs about 10 feet high, the cornel-like one 20 feet. Cereus Pringlei, now a 4-ribbed cereus. Mimosa, Agave vexans. Very much Bombax and a yellow flowered species too, for the first time, flowers 2-3 inches wide. Cereus Pringlei, 9-ribbed. Much Jatropha canescens. Hoffmanseggia pallida. Some flat Opuntias. Bullrush. Much thorny

brush without leaves. Tall grass. Amole. Much dead grass. Brush now 20 feet high. Tillandsia, with long and red flowers. The amole has red leaves. Corn is tassled out, near by is more only a foot high, some 6 feet high. Now a town with a cathedral on the left. Baccharis viminea. Very much long-leaved Encelia. Vines many. Bananas. Cattle. Tall Malvaviscus herb 6-8 feet high with very small flowers. Now the frond-like shrub again. Now girls with 6 foot long stalks of sugar cane. Narrow-leaves Lycium Mimosa same as at Nogales. Now another very broad leaved Mimosa. Yellow Lantana. Now see Mexicans with machetes. Now a six-mule team, four in front abreast. Train left Mazatlan about 5:15 p.m. Now sundown and getting dark, near sea level. Brush.

February 8, 1927. Tepic. This is in the hills, 3,000 feet altitude, and with hills 2,000-3,000 feet higher around it, grassed over and with scattered trees on them. Gulches dense with brush or timber. Sod everywhere. The bottoms of gulches are mostly narrow and moist, Adiantum species on side walls on north slopes, also Selaginella and some Notholaena sinuata and another species. Gulches have a rigid Polypodium and Aspidium (long fronds over 2 feet long), also weak annuals such as Lobelia, Drymaria, labiates, etc. A big and shrubby Senecio, 10-15 feet high. Some Cucurbita species. Grass seems to be some Devil grass on drier places and a broad-leaved Cyperus, also a tall bunch grass 3-4 feet high, now mostly out of fruit. Some Tillandsia. Saw a vine with a big 3-cornered fruit 3-4 inches long. Now a Eupatorium shrub, a Brickellia. Strawberries ripe. They sell strips of fresh cocoanut meat for a cent each Sapindus. So far I see no cactus.
(centavo), also a round berry about the size of a gooseberry, may be

February 10, 1927. Tepic. Saw a few flat Opuntias yesterday, also some Yucca australis, no Petaya cactus nor Mamillarias. Some of the trees have ash-like leaves and bark like the oak but neither flower nor fruit. There is a deep cut made by a runoff ditch from a ranch near by that is 50 feet deep and 4 feet wide and mostly with vertical walls, 2 miles long, full of ferns and moss and Marchantia, Polypodium, Adiantum 2 species, Aspidium, Notholaena, Gymnogramma, also mints and Schrophs, Verbenaceae and some Compositae, Solanum, Lobelia. Soil is heavily sodded and wears only in the cuts where it is a fine and uncemented volcanic conglomerate. No running water nor signs of irrigation. Have many deep wells and pull up water by ropes. Have seen no windmills. Water is good. They have a water system and electric lights, but no gas nor stoves in town so far as I can see. Streets are paved with rounded or flattened cobblestones, and are worn concave in cuts. Walls of streets are of cement and 1-2 feet high, and narrow (sidewalks). Streets narrow but straight mostly. Big cathedral. Big plazas full of flowers and trees, cocoanuts, bananas, etc.

Tepic, February 11, 1927. Went out toward the river on the railroad bridge. Got a big bundle of stuff. Got in a swamp full of peculiar Phragmites (?) like grass, and had to walk half a mile in water up to my knees. Got some interesting things, such as Azolla, and Marsilea. The ground everywhere wet and soggy. Trapa everywhere in the water,

Cattle eat it, spans the river in one place, 30 to 50 feet wide. River rather deep, slow and opalescent. Much frog-spittle.

February 12, 1927. Went across the railroad bridge and botanized on the bluff near by. Rained a fine drizzle all day. Toward evening the streets running with streams of dirty water. Cold and raw. Had to go to bed at 4 p.m. to get warm. Every drier full and then some. Have not yet reached to base of the mountains.

February 13, 1927. Spent most of the day drying driers; slow work because of clouds. People here are usually intelligent. Lowest class, both sexes go without shoes or stockings and are dirty, but upper class dress like home folks. All women and girls seem to wear tight drawers and have skirt separate from waist, no caps nor bonnets. Many street vendors on the corners and balconies or on covered ways (verandas). They have a tortilla-grinding mill here. See many women with bowls full of dough. There are two big coquita trees in the Plaza (Attalia cohun). They are 75 feet high, straight as a die, and with immense leaves and long spikes of fruit. Streets narrow. It is a place of 10,000 people. Soliders at state house. Governor was deposed the other day, and no one seemed to care. Rained hard for a short time.

Tepic, February 14, 1927. Went south to the foot of the mountain, but got loaded up so that I had to turn back. Got poisoned by Ivy. Saw a third species of Adiantum today. Got one big tree. It is amazing how many species there are as I work over the ground, and am not yet up to the mountain.

Tepic, February 15, 1927. Took a third trip to the south mountain and got up about 500 feet to the pines when I was loaded down again. Grass in places 6 feet high, a Bealea ( ), also Bromus, Aristida, Phragmites-like species, some Bouteloua hirsuta, Mints, Compositae, some Adiantum in the open. A tree with oval and woolly leaves and Martyniaceous flowers. Damp canons with a great leaved shrub with masses of red berries and stinging hairs. Found two species of Polypodium growing on a tree. Got several new ferns, one Adiantum 5 feet high by 3 feet wide. Saw the usual one two feet high growing from a cliff. Saw an ant nest that looked like a double handful of cow dung plastered on a tree 10 feet above the ground. Was full of black ants that fought like fury and stung hard. Hillsides a solid mass of plants, Grasses, Linum, Lobelia, mints, Leguminosae, Erythraea, ferns, also a Pteris. Got a tall Leguminous plant with habit of a mint. Selaginella in all canons and also Marchantia, and some small mosses. There is a Hyptis like mint in full bloom, and also a big red Lobelia. Got very tired lugging my load home. The day's collection made a pile all that a set of straps could hold. Weather clear and cool. Humidity very high all the time, heavy dew every night. Ocean haze all the time. Ocean 40 miles off to the west.

February 16, 1927. Went toward the depot today and got a Castilleia like ours at home. Got a Lepidium and Ipomoea on a wall. Weather mild. Humidity all day 85%. The coquita trees in the park are about 75 feet high and 2 feet diameter, leaf sheaths about 6 feet long and per-

sistent, differing from the deciduous cocoanuts, and do not turn down until ready to fall off. Fruit cluster about 2 feet long, fruits about as big as unshucked walnuts. The oak wood they sell here for fuel is 4-6 inches thick, heavy and close-grained, and slivers on splitting, is dark in color. Their leather made from native oak tanning is good and they make many sandals.

February 17, 1927. Got on train and all ready to start at 1:30 p m. bound for Ixtlan. Nothing but construction trains east of here. Had to wait half a day for train from the north, then no first class car on train. Sugar cane 6-7 feet high, ready to cut, old fruit in a panicle but seldom seen. Grassy plain with black soil. Helianthus. Going east. Large cattle, many. Now in rough country with oak forests, a small river below. Then we cross river on a high trestle. Now out on a grassy plain with vegetation like that of the old Iowa prairies. This is at second station out of Tepic. Two ponds of water. We are now lower down than Tepic Trapa in the water, Bullrushes, Crotalaria herb in fields. Narrow-leaved willows. Cereus Pringlei or a species like it but more branches and with fewer ribs (7-9). Now more arid and less grass. Tuna, yellow-flowered tree with big flowers like the cornel in habit. Much tuna-like Opuntia 5-10 feet high. Road now very twisty. Terra-Pelon (sounds like this) station. Cereus Pringlei (?) with trunks tapering as in Thurberi and as many, in full flower. Much drier now, grass short. Country getting rough again. Saw an herb which seems to be full of big globose and racemose pods. Bursera with brown bark, but leafless. Very much flat Opuntia tuna, and about the size of the Cardon. Forests in the gulches, the rest grassed over. See some trees in the distance that may be Cupressus or Juniperus.

Conde station. Large fields of Agaves planted. See an occasional Cereus Thurberi, and two species of bottle-brush cactus. Grass looks like winter, as if it had been frosted. Altitude still below that of Tepec as shown by barometer. Tall brush 10-20 feet high, may be a Fouquieria but has yellow apple on it (probably Crescentia alata).

Titiklan station. Corn in tassel. Watermelons. 3,500 feet altitude.

Ahuacatlan station. Yellow-flowered bush a mile or so below on the north on lava. Saw red flowered Asclepias in field. Argemone alba common. Datura Stramonium, Nicotiana glauca is common all through Mexico. Washingtonia Sonorae is cultivated here. More Tuna, 30 feet high, with trunk over a foot thick, the flowers seem to be light-purple, surface of joints is smooth and shining and dark-green, variably spiny.

Ixtlan. Streets are paved like Tepic. Can't be more rainfall than 20 inches. Trails are very old, 10-15 feet wide, usually with 4 paths parallel. Few roads suitable for autos or carts. Autos in town. All hauling on trails is by oxen dragging lumber or logs, or by burros packing merchandise, firewood, charcoal or forage. Trails near town fenced in by stone walls. Rock is all eruptive mostly basalt. They have for sale here on the market a black colored physalis, also many kinds of peppers. They cultivate a Crotalaria. There is a male date palm in the plaza 50 feet high, no others. Bananas are raised here for the market, sugar cane,

turnips, fine lettuce, tomatoes, potatoes and sweet potatoes, peanuts. They have oak wood for fuel and charcoal. They have many player pianoes and phonographs here.

February 20, 1927, all packed and on train for La Barranca. Hot today. Barranca is a little place with shanties and not conveniences. Got a kind of a place to stop. Very dry and hot here, more so than at Ixtlan. Altitude about 4,000 feet. Hills around are about 1,000 to 2,000 feet high and rather flat-topped, covered with pine and oak woods, all grassed over, grass short. Volcanic soil. Erosion great. The barranca is to the east and south and is 1,000 to 2,000 feet deep and covered with vegetation, a kind of native bamboo 20 feet high, but there is other tall grass 3-5 feet high in bunches. Very much Tuna of big trees 30 feet more or less high, with shiny and dark-green bark. There are some Cereus Pringlei and Thurberi. In the canons is a Mamillaria about 6 inches high, single or tufted, broad at tip and no hooks. Tuna will soon be in bloom. Scattered Bursera with dark-brown bark is the more common, but the light-gray barked one also occurs and has a mistletoe on it (Loranthus). The Cornel-like tree has what seems to be a true Rhododendron on it. The Martyniaceous tree with big spines on the old trunk has a cucumber-like fruit bearing cottony seeds. So it is a Bombax. Mesquit, Nogales Mimosa (biuncifera ?). Many trees are like the rubber tree with shiny and big leaves (Ficus). Bananas grow well here, also sugar cane, oranges,, lemons. There is a small native blue palm in the canons without threads on the leaves, which are 1.5 feet long, and with small trunk. There is a Yucca (australis ?). There is a red leaved Agave. The 3-cornered Cereus (Schottii ?) on cliffs, also one on trees, also a Pedilanthus. Very hot and dry here. Some yellow-flowered Cornel-like trees. Bursera is leafless and starting to flower. Half a dozen species of ferns, 3 Adiatums, 1 Polypodium, Aneimia Mexicana, Aspidium (a large one), 3 species of Selaginella, one is lepidophylla. At the springs in the barranca is a Juncus like Balticus, a Cyperus, a Paspalum, several lichens, and 3-4 epiphytic orchids, Tillandsia but none in bloom. Trees are rarely 20 feet high except in gulches, oaks on slopes 20 feet with big leaves, no fruit.

February 23, 1927. Left barranca in the evening and got to Tepic at 10 p.m. Next day started for Acaponeta. Weather clear. Baccharis viminea. Much yellow composit (Eupatorium ?). Trapa. Echinodorus in water as we cross the river. Red Agave (may be amole). Cane fields, Nogales Mimosa. Much reed-like grass on river, Trixis. Big fig trees. Low white flowered Mimosa. Grass everywhere. A little lake with opalescent water which may be due to soap (women washing in it). Now at a deep draw full of brush. More shrubbery coming in like Tepic stuff. Red Lantana, Convolvulus or Impomoea. Much ocean haze, Encelia. Cane 8 feet high. Now in brush 20 feet high. Now a beautiful bush in full flower like a red bud (Cercis). Grassy slopes, Cornel tree.

Labos. Women with soap on bushes. Red bud in leaf, springs, grass, sugar cane. Red soil. Hauling cane with 6 mules, two behind

and four in front abreast.

Imla. Like a camp. Soil seems very porous and spongy. Station, did not get name. Wide and smooth road. Cane fields, some of them burnt over. Low hills, wide mesas, all grassed over. Mexicans are great lovers of flowers and music. Salix Bonplandiana. More cane fields. Elms or like them, also resembles Corylus. Soil very red. Grass 3-4 feet high. Deep-red flowered bush with big flowers. Reddish water. Railroad equipment good but poorly handled. More grass, tall, much Andropogon. Bombax. Mountains high over at the north. Red leaved tree. Deep barrancas. Bamboo. Solanum bush 8 feet high. A leguminous bush with flat pods 6 inches long. Tall grass. Nuches station. Irrigation ditches. Oak-like bush, a black oak (?). More barranca 200 feet deep, all volcanic. Red-flowered bush again. Air getting far more humid. Tall bamboo grass in flower now. The yellow-flowered tree has a big ovate or oval fruit 3-4 inches long. Very rugged now, big bridge. Oblong-podded Leguminous shrub. Much Andropogon. Station, did not get name. More barranca, Erythea, cultivated Washingtonia Sonorae, velvety-red-flowered tree. Good roads. More Erythea or Washingtonia. Cardiospermum. More palms with very slender trunk. Oaks. Kilometer 1,052. Much oak brush. Much palm in flower. Fern-branched Rhamnaceous shrub. Some big trees, everywhere brush. Station, did not get name. Pectis-like tall herb. Big red-flowered orchid in tree. Big grass or Yucca-like, soft leaves. All forest except here and there a grassy park. Trees hanging with vines. Very rugged region. Palms all along. Now along river, more open. Station, did not get name. River 20 feet wide. Cuscuta on tree. Kilometer 1,020. Just saw a big tree with a palm growing in the center and almost dead. Down by the river, the water is 500 feet wide and slow. More grass and trees. Yellow-flowered cornel-like tree more common. Wild oats. Tunnel. The trees that look like dates may be coquitas. Erythea in full flower. Kilometer, 1,013. Palms everywhere, the chief trees. Grass, few bushes. Now night and cannot see vegetation.

Acaponeta. Stopped at Sud Pacifico hotel by depot. Low hills all around and apparently all wooded. The Pumpkin tree Crescentia alata is cultivated here. The fruit is round and green till ripe, and 4 inches diameter. The leaves have winged rachis, and the flowers are nearly black and come out from the main trunk of the tree. Went out to the hill west and got a lot of shrubs. There is a yellow-flowered Bombax tree here.

Friday went again to the hill and got a smaller load. Very hot and dry. The bark of the Bombax is soft and the wood very brittle, leafless now, branches few and long and smooth, gray like the figs. The other yellow-flowered species has much the same bark but branches shorter and more slender. Then there is a clothespin bush, fruit like a clothespin. Tree 20 feet or more high and no leaves now. Then there is a woody vine, leafless now, with enormous flat and thin pods a foot long and 3 inches wide and 1-2 mm. thick. Then there is a shrub 10-15 feet high whose branches become vines and twine at the tip; the flowers are bril-

liant-orange, linear, in masses on one side of a rachis, and can be seen for miles. Bark is smooth and gray, trunks 6 inches diameter. Did not see fruit. There is the 3-cornered Cereus, also Cereus Pringlei, and the flat Opuntia. No wild palms here so far. Red Agave is common. Saw one Lygodium fern not in fruit. There is a Ludwigia with evanescent flowers, petals an inch long and yellow. Many vines here. Many thorny trees and brush. No catsclaw. Manzanillo Mimosa common and with the little black ants in the enlarged stipules, whose bite stings for a long time. There is a tree with soft leaves, it is about 20 feet high, that has pods 4 inches long, by 1.5 inches wide and an inch thick and very heavy. May be a Pithecollobium. There is very much grass here, but not in condition to study or collect. Hills mostly covered by brush 20 feet high. Some large cane fields. River near by on the south. I should judge that the mountains are about 10 miles off to the east and 2,000-3,000 feet altitude, and apparently covered with brush. Air feels quite moist but it is very hot at noon. The city is the usual Mexican one. There are some autos, no carriages seen.

Saturday, February 26, 1927. Went south along the track to and a little beyond the river to the old time sugar mill. Here they have an old fashioned sugar crusher run by steam, the rollers horizontal, and below them a cement tank 2 feet square into which the sap falls. Then a force pump raised it ten feet to some boilers which are wood-fired below. Each boiler is about 20 feet long and the sap is skimmed by mosquito-netting skimmers. Then at the farther end the sap is let into two circular cast-iron vats 4 feet wide and again boiled down to sugar bubbles and skimmed again and continually stirred by wooden shovels, all by hand. Then when it will caramel it is ladeled out on to wooden slabs with conical holes bored nearly through and 1.1½ inches deep. The holes are kept moist with water and are then poured full of the hot liquid which at once sets. When sufficiently cooled the slabs are carried to vats and reversed and pounded on the bottom with wooden mallets, and the sugar cones drop out. The slabs are then rewetted and used again. The sugar cones are called pinoche and are packed in crates weighing 100 pounds or thereabouts and shipped or sold. This sugar is brown and entirely untreated, and is the chief article of commerce. Here I got quite a lot of fine specimens in an abandoned field near by. Here I saw a date tree growing wild in the brush. The river here is about 200 feet wide, and flows slowly. Every day there were about 150 women strung along in the water washing clothes on rocks used as rubbing boards. Each woman up to her hips in the water, and with a single garment hanging by the shoulders. Boys guyed me again today but were not specially offensive. There is a warty-spined tree like the Bombax but has flowers in corymbs or Sapindus-like clusters. It has few branches and the bark is gray and spongy. Got a Lemna here. Met a civil engineer in charge of the railroad here who says 10% of the gross revenues of the railroad go to the federal officials, who steal it. Says they will lie when cornered, and then laugh at you if you believe them, and that there are no honest public officials. He says it is a great change since the revolution in that respect,

and yet Calles executes all bandits. Hear many birds singing here.

February 27, 1928. Yesterday clouded up and looked like rain but cleared off this morning. Will be hot. Dead weeds in the streets show that there is much rain in summer. Weeds mostly Malvaceous, 2-3 feet high, with some Euphorbia. There is a little turtle dove here, about half the size of ours, with short and black bars on wings, and black tips to tail. The head is lighter than the body. They are very quick. Saw three Californian quail yesterday in the brush. I heard their call at Tepic but did not see them. At Ixtlan there are two kinds of buzzards. I also saw crows.

February 28, 1927. Went to the El Tigre mine on horseback. This is some 26 miles east of Acaponeta, and the mine is 1,400 feet altitude, but the mountain back of it goes at least as much higher. It is at least 10 miles to the crossing of theAcaponeta river. The water flowing there being about 150 second feet, and clear. Then began a long climb up the mountain. At first the region was somewhat mesa-like for a few miles through rolling hills. Then up a long gulch with steep sides. It was very dry all the way, and hot, but the canon where shady was moist where there were ferns and Selaginella. Stopped at a hut not far from the river to get a bite to eat for breakfast, and also at another hut in the canon for lunch. At the mine Mr. Kelso and the manager were very kind and gave me every convenience to recover from the strenuous ride. Next morning I went through the mill with the manager, and collected some plants on the way. Then started back, leading the mules and botanizing along the way, getting a great stack of things. I saw a tree they call Tapoma, whose branches they cut down and feed to the cows in dry spells to make them give more milk. The tree is very tall, has bark like the shag-bark hickory, and leaves like the elm. They say it will increase the breasts of women and is used for that purpose, and that the fruit is also eaten, and tastes somewhat like the cherry. The bark is white or whitish. Oaks were everywhere on the way down about the hill but saw no pines there. Many plants they call palmilla (possibly Sabals). Saw and got a very peculiar Selaginella which was creeping and rooting. There was considerable Lygodium along the way in the brush. Got the fruit of the warty-spined Bombax (?) tree. It is like the fruit of Malva, is 4 inches wide and 2 inches thick and stands erect andsingle. Saw a very narrow Tuna ( ) like the big one but joints only 2 inches wide by 6-8 inches long and flowers yellow. Saw a few 4-angled Cereus with short trunk and sprangling branches, different from any seen hitherto. The epihytic Cereus is common and mostly 3-angled and grows in trees or on the ground. The agent at Acaponeta was very obliging and fixed up my baggage so that I could leave on the train at midnight. Very hot and dry. There was a fog in the morning, and dew every night. The Cereus Pringlei is scarce here. The railroad agent gave me two for one on my Express checks and so made 10 pesos out of me.

Reached Mazatlan at 8 a.m. and got no sleep on the way. Now on train bound for home. Stratus clouds. Train with 6 cars loaded. Corn tasseled out. New vegetation about 6 inches high. Antigonum leptopus is

here too but less common. The big yellow flowered tree without tube to corolla is here but low. Marsilea covers the ground in places, large patches.

Near Culiacan. Half a mile from the sea. Several new Cereus here. There is a shrub with brilliant-yellow twigs, leafless now. Bombax. Cereus Pringlei. Brush now low. Amole with purple leaves.

Ojabe (?) station, 675 kilometers. Caesalpinia pallida, Yellow Lantana. Rochella. Brush now about 15 feet high.

Tanques station, 698 kilometers. Much charcoal here. Fouqueria peninsularis. Below a way I saw some Parkinsonia aculeata, first seen so far. Sky-blue-flowered Solanum, no white ones. Have passed through many miles of shrub that looks like Lysiloma, with many white stems arranged in corymbose style coming out near the base and having horizontal pods 4 inches by ½ by ¼ inches, a leguminous plant, near Prosopis. Passed great globose balls (?) of a night-blooming Cereus-like-flowered tree, like that at Barranea. About 75 miles south of Culican saw three of them. Parkinsonia more frequent now. Hot, traveling fast. Olneya. Getting drier fast and hotter. Now at Culican. Town is on east side of track by the river. About 30 miles north of Don got a Franseria with ovate leaves. Capparis. There is a brilliant-pink flowered bush 10-15 feet high that is not Antigonum leptopus. Saw it first near San Blas. Fouqureria peninsularis is out of leaf now, but in flower and fruit. Palo verde common here, also Cereus Thurberi. Mesquit in bloom, Cereus Pringlei a little past the peak of blooming season. Very dry.

Navajoa, Cajeme. Very big town, very hot and dry. Encelia cordifolia in bloom. Vines now. Palo verde, Olneya, much mesquit.

Fifteen miles north of Bacum we strike what looks like the true Cereus giganteus; stems are a foot or more thick, strict and with few branches, and no joints, at least twice as thick stems as in Pringlei, but no flowers yet; many woodpecker holes in trunk, ribs at least 15, may be more and shallow, a stately tree. Encelia everywhere. A Malvastrum like angustifolium in bloom.

Lencho. Here are two finished forts with sentinels. Long-leaved Franseria common. Helianthus Californicus (?). Cereus Pringlei getting a little past bloom. Opuntia leptocaulis in bloom, the flowers lemon-yellow. Much haze. Several Leguminosae in bloom. Mesquit nearly in full leaf.

Saturday morning. Left Guaymas about 8 p.m. Took sleeper and got my first good rest. Now 9 a.m. and we are below Magdalena. Hot and clear. Very much of a yellow-flowered plant like Senecio Douglasii. Little else in bloom. Mesquit and Larrea everywhere. A little way above Magdalena saw Rumex hymenosopala, Sambucus glauca. Grain a foot high. Peaches and pears in bloom. Bush like Baccharis but flowers in flat corymbs and yellow (Trixis). Some barley heading out. I saw Plantago major at Ixtlan and Acaponeta and also below Nogales. Cottonwoods just coming into bloom at Nogales. No other vegetation out. Got to Nogales at 1:30 p.m. Took an hour to get baggage over to U. S. No inspection at either place. Got dinner and took stage for Tucson to

get the evening train home from there.

Niland. Annual vegetation a few inches high. Astragalus limatus in bloom, Encelia eriocephala in bloom. Had a hard rain here in last few days. Everything wet.

NOTES AND NEW SPECIES OF MEXICAN PLANTS

"Anemia intermedia Copel Sp. n.

Rhizomate breve, adscendente; stipitibus pluriseriatis, fasciculatis, usque ad 8 cm. altis, rhachibusque pilis ferrugineis fuscentibus 1-2 mm. longis densissime vestitis; fronde 5-8 cm. longa, ovata, tripinnatifida, inter pila albida aliis hyaliniis nitidis minutis pluricellaularibus absita; pinnis infimis frondum maporum fertilibus, late ovatis sequentibus vix aequantibus, horizontalibus, bipinnatis vel maximis rhachin prope etiam tripinnatifidis, lamina valde contracta pilis omnino occulta; pinnis sterilibus inferioribus, 3 cm. longis, brevissime pedicellatis; pinnulis infimis subopppositis, pinnatim incisolobatis.

Mexico, Nyarit, Acaponeta, "El Tigre Mine," altitude 1,000 m.. Marcus E. Jones, No. 23472, March, 1927.

The nearest relative is *A. Brandegeea* Dav., a much smaller and correspondingly less dissected plant; both are alike distinguished from *A. anthhriscifolia*, probably their nearest relative, with long-taslked fertile pinnae, by the comparatively slight modification of the latter. The suggestion naturally raises itself that this is an ample form of *A. Brandegeea*, respectively that the latter happened to be described from a very stunted form. But it is very clear from the uniform and freely fruiting material of that species in the Brandegee herbarium that the specimens are fully adult. If dwrafed, then, it must have been by the environment, which would almost certainly have accentuated the hairness. But the plant here described is not only much larger, but also decidedly more hairy, the difference being most marked on the fertile pinnae. Also, the broadly club-shaped shining microscopic pluricellular trichomes are distinctive. Beyond the almost or apparently opposite lowest pinnules, the succeeding ones are borne lowest on the acroscopic side.

The termination of the specific name *Brandegeea* was clearly deliberate on Davenport's part, as shown, in connection with the publication, by a manuscript postal card preserved in the Brandegee herbarium. It can be construed only as a proper noun in apposition. However much better Maxon's change to the genitive *Brandegei* conforms to general usage, I do not believe that it is permissible, any more than is a change in Swartz' spelling, *Anemia*." Copeland.

Remarks by Jones. I have seen the postcard referred to and agree that on its face Davenport wrote the word Brandegeea, but it is in my opinion a clerical error for Brandegeeae, he intending to honor Mrs. Brandegee.

The type specimens and localities were accidentally omitted from the following:

Pentstemon flaviflorus Jones Cont. 12 66. Colonia Juarez, Mexico, September 12, 1903, 6,000 feet altitude.

Collinsia Brucae Jones Cont 12 69. Little Chico, California, June, 1897. No. 2063, Mrs. Bruce.

In regard to the blunder in my key referred to by Fernald I would say that the error arose in my finding other material with more leaflets than in the type species and which I referred to the type, but I failed to correct my key accordingly. This would tend to vitiate Fernald's new species.

Allionia and Wedelia were first named by Loefl. in Iter 191 and 180 but with no species attached (1758). The first mention of species is in Linnaeus's Systema ed. 10 890 where both genera are mentioned with species. The question of priority seems to be based on which genus came first on the page.

Himantostemma Pringlei Gray. This plant seems to grow at La Paz. Certain things which Gray failed to see in this plant are very peculiar. The very rough pubescence is made of tapering hairs which are warty and stand out straight from the stems and leaves. The bark is very corky and splits up into rectangular areas. The copious hairs on the inside of the corolla are flat and ribbon-like, and mostly white and about as long as the appendages. The outside of the corolla is hairy like the leaves toward the tip and the segments are conspicuously 10-veined.

Callitriche Mexicana N. Sp. Plants wholly submerged. Leaves

Drymaria crassifolia Bth. It takes a tremendous stretch of one's imagination to accept this species as a Drymaria. It is clearly perennial. linear-oblanceolate, about 1 cm. long and 2-3 mm. wide. Internodes short. Flowers sessile. Fruit oblately rounded, about 1 mm. wide, rather deeply notched above and below and nearly sessile. Growing in ponds at Tepic, Nyarit, February 11, 1927. No. 22877.

Drymaria Tepicana N. Sp. A weak and diffuse annual with fibrous roots, and widely branched throughout, a few inches high. Ashy throughout with slender, white and flat jointed hairs, particularly on the internodes and calyx, the leaves sparsely hairy, uppermost floral internodes smooth, but pedicels hairy. Leaves rhombodial and deltoid-acute at both ends, about 8 mm. long, on stout petioles half as long as body, thin. Internodes 4-grooved, hardly twice as long as the leaves, few. Inflorescence twice as long as the rest of the plant, with scale-like lanceolate bracts about as long as the sepals, intricately and dichotomously branched and with many flowers on divaricate and capillary pedicles about 6-9 mm. long. Flowers 2-3 mm| long, broadly ovate. Sepals green, nerveless, oblong-ovate, acute, with very narrow hyaline border. Petals rudimentary and linear. Growing in waste places in fields, partly erect. Tepic, Nayarit, February 16, 1927. No. 22847.

Drymaria subsessilis N. Sp. Stems apparently annual, growing in mud, very weak and filiform, a foot or two long and prostrate, with internodes 2-3 inches long, divaricately branching throughout and wholly glabrous. Leaves when fully developed about 1 cm. long and 1.5 cm. wide, round-remiform and pointless, almost sessile on very stout and thick petioles. Flowers 2-5, rather cymose, on divaricate and capillary pedicels about 1 cm. long. Bracts about 1 mm. long, hyaline with green center, and acutish. Flowers about 4 mm. long, open. Sepals narrowly eliptical, almost nerveless, and pointless, and with hyaline and broad margins. Petals about a half longer than the sepals, with divisions nearly linear. Growing in rivulets at Ixtlan, Nayarit, Feb. 19, 1927. No. 22848. Stipules hyaline and terminating in hair-like tips. Plants occasionally rooting at the nodes. This species may be D. cordata Willd.

Drymaria Blasiana N. Sp. Annual, diffusely erect, intricately much-branched with filiform stems dichotomously branched at nearly every node, and ending in loose and sub-racemose cymes of greenish flowers. Whole plant rather roughly glandular hairy with flat, very short, blunt and bent white scurf or hairs, particularly the sepals. Internodes about 4 times as long as the leaves. Leaves ¾ to 1 cm. long and about ¼ wider than long, rhomboidal to almost reniform, thin, abruptly cunate below, very abruptly deltoid triangular at tip, on a petiole about 3 mm. long. Stipules capillary and about half as long as petioles. Bracts of the inflorescence like the sepals and ¾ mm. long and acuminate. Lower nodes of the inflorescence with a single flower on a pedicel fully half as long as the flower, then a subracemose floral arrangement of 3 to 5 single or twin flowers with bracts, and a terminal cluster of mostly 3 flowers with short pedicels. Fully developed flowers 3-4 mm. long,, narrowly elliptical and acute, ,opening but little in anthesis, with narrowly eliptical sepals with broad and scarious margins, the tip rather lacerate and abruptly setaceous-cuspidate with a hooked or arched spine about 1 mm. long or less. Back of sepals strongly keeled when ripe with 1 to 3 raised nerves. Petals white, deeply notched and about half as long as sepals, and narrow. San Blas, Sinaloa, January 20, 1927, growing in open places. No. 22845.

Cleome Sinaloensis Brandegee. Zoe 5 198. This slender annual is about 2 feet high, and erect, and openly branched as in C. lutea. The terminal inflorescence is short and few flowered, and with conspicuous leafy bracts clustered. The leaflets vary from broadly ovate to triangular acuminate, generally about an inch long and very short-petioled. The pods spread indifferently from pendulous to erect, are rather flattish, very torulose, empty and acuminate at both ends, green, nearly straight, the empty parts 3-4 mm. long, with the proper stipe rarely over 4 mm. long, body about 3 mm. wide, linear. Seeds 10 to 15, yellowish, sharply warty all over or sharply ridged. The whole habit of the plant is that of Epilobium paniculatum. My specimens got at Mazatlan in fruit November 20, 1926.

Wislizenia. I agree with Brandegee that there is but one species of this genus in Lower California. So far as I have seen all the Lower California specimens are shrubs, and are quite common at La Paz along the beach. I also saw the same species, clearly an annual, and collected it at

Hermosillo in 1926. Petals 3-4, almost rotate-spreading, concave, slightly clawed, 1 cm. long, the upper two a little smaller, contiguous; the lower pair opposite and occupying the middle, there being a distinct hiatus where the fifth petal should be, and this space occupied by the declined stipe. This gives the appearance of a leguminous flower with the keel absent. Stamens widely spreading, and with filaments arched. Anthers acute, linear, extrorse and curling inward when open. Stipe of pod 1 cm. long, very slender, as is the not capitate style. Pods arranged as are the testicles of dogs. To my mind the attempt to break this genus up into several species is futile because the characters have no ecological or structural worth. In the north, where the colds of winter make real differences in structure desirable and useful to the plants, certain characters have significance, but in the south, where there is no cold to combat, we cannot carry our methods and make them apply to conditions of growth, which are the only determining factors. There are many plant structures which in their native areas have significance, and those plants having them take with them as they migrate to other life ones, and which in time they drop as useless organs, but which at the present time are not entirely obliterated. For example, most of the pears and cherries are immigrants from the south and have evergreen leaves which they are hard to lose. The same is the case with the Sycamore (Platanus racemosa), which also is a true evergreen, but in northern Mexico and California tries to become deciduous. The reverse is the case with the elm, which is a nautral deciduous, but which carries this tendency everywhere to shed its leaves in the early fall in the Tropics. The same tendency, that of holding over the winter, is seen in the Eschscholtzia, in Helianthus annuus, in most winter annuals, in Wislizenia, in Gossypium Barbadense, which in California is an annual but in most of Mexico is a woody shrub, etc.

Idodanthus striatus N. Sp. Erect annuals, 2-3 feet high, copiously and racemosely branched throughout with ascending branches. Whole plant smooth or the older and lower leaves sometimes pubescent with short and simple hairs. Leaves thin, 2-3 inches long, ovate-acuminate to lanceolate-acuminate with cuneate base and slender petiole about half as long as the blade, mostly entire, but lower ones sometimes sparsely dentate. Flowers in long and terminal racemes which are bractless, white. Sepals about 3 mm. long, narrowly elliptical, green, with white margins, several nerved, thin, the outer ones rather saccate below. Petals oblanceolate and rounded, with two pairs of short teeth on the sides, distinctly clawed, spreading, 6-7 mm. long, conspicuously nerved. Stamens ovate and acute. Pods about an inch long, mostly horizontal, flattened parallel with the partition, smooth, a little torulose, conspicuously several-nerved, shortly stipitate, conspicuously beaked with beak fully 1 mm. long. Stigmas rarely a little lobed transversely. Seeds oblong, not winged, yellowish, about 12. Partition very thin, with short and rather oblong but distorted meshes. Pedicels filiform, about 6 mm. long, spreading. This plant has the technical characters of Idodanthus more than of Dryopetalon but it has the toothed petals of the latter, and grows in similar situations. Waste places, Todos, Santos, February 17, 1928, in washes north of the

town. No. 24189 and 24130, February 8.

Argythamnia bicolor N. Sp. Slender shrub, 2-3 feet high, erect, stems and upper inflorescence hoary with very short white and spreading hairs, and above with stalked and yellowish glands intermixed. The margins of all the leaves glandular ciliate, as are the sepals. Leaves oblong-elliptical, 3-6 cm. long and rarely 1 cm. wide, obtuse, cuneate below into a slender petiole 1 cm. long, sparsely and softly pubescent on both sides with very fine hairs some of which are gland-tipped, and some are copiously branched as in Alternanthera. Upper surface of leaves brownish, lower surface strikingly yellowish-white, but without extra pubescence, the color arising from the epidermis, from which character arises the name. Inflorescence in the upper axils, about 1 cm. long, with the two or three male flowers above, and the single fertile one below. Bracts of the inflorescence 3-4 mm. long, lanceolate and conspicuously and apparently laceately toothed because of the green and stout bases of the glandular hair, which characteristic is also with the sepals. Sepals linear and 3-4 mm. long, nearly a half shorter than the oblanceolate and red-striped petals. Pods depressed-spherical, about 4 mm. long, blue-black, appressed-hairy slightly. Seeds tan-colored, irregularly and rather deeply pitted, truncate-ovate, and nearly 3 mm. long by 2 mm. wide, acute at the closed tip. No. 22727, Hermosillo, Sonora, October 26, 1926, growing among the rocks on the mountain back of the city. Whether this is A. subviscida Watson I do not know, since I cannot find the description of that species. But this is a remarkably distince species, and allied to the narrow-leaved species group.

Desmodium luteo-canescens N. Sp. Shrubs 3-5 feet high, erect, slenderly and racemosely branched and with branches erect, and reddish and nearly smooth, terminating in compound racemes, and leafy to the bases of the proper racemes, which are about 6 inches long and linear because of the rather appressed flowers and fruit. Leaflets 3, the terminal one about twice as long as the lateral and 4 cm. long and 1.5 cm. wide, elliptical-ovate, flat, rather thick, venose below and a little lighter there, densely short-yellow-hairy all over, with petioles shaggy, and about 4-6 mm. long. Banner sky-blue, becoming not over 4 mm. long, the stamen tube white. Calyx short-pubescent, the lobes ovate, becoming triangular and elongating somewhat, about 1 mm. long. Young fruit densely hoary, and becoming rather short-shaggy, spreading, with yellowish hairs which are rather flexuous but not hooked, sections mostly 3, contiguous, 4-5 mm. long, obliquely oval, rather strongly cross-reticulated and with thickened margins. Pedicels in fruit about 5 mm. long and capillary, and ascending. No. 23054, got at Acaponeta at the El Tigre mine in oak woods, March 1, 1927. This belongs to a group with the rounded and very obtuse leaflets, not apiculate, but cannot be placed anywhere apparently. Stipe 2-4 mm. long. Terminal joint apiculate and not produced. Leaf-rachis twice as long as petiole proper.

Desmodium luteo-canescens var. curtum N. Var. Pubescence sparse on the upper part of the leaves and legumes, and leaves much more deeply venosely reticulated. Joints of fruit with short stipe between which is

mostly 1 mm. long, main stipe fully to twice as long as first joint. Joints either round or rather broader than long, not 4 mm. long, 3-5, the terminal one long-apiculate, all greenish. Stipe of the type species never is over half as long as the first joint. No. 23055. Ixtlan, Nayarit, February 18, 1927. Flower deep-blue.

Malpighia Sonorae N. Sp. Allied to M. ovata Rose. An intricately branched shrub a few feet high, and nearly glabrous, with the habit of Symphoricarpus oreophilus. Leaves opposite, oval-ovate to ovate, about 2 cm. long by 1 cm. wide, thin, entire rounded at base and the upper ones shortly acuminate or acute at tip, or the lower ones oval and very obtuse, covered below very sparsely with long and very slender white hairs fixed by the middle (as in M. urens), on short and stout petioles about 2 mm. long and which are silvery silky, as are the nodes. Stipules hardly longer than the hairs. Flowers not seen. Fruit depressed-globose, red, ,about 7-ribbed by the protruding and sharp ridges on the seeds, red, about long, on slender pediael sometimes joined below the middle cnd a little over 1 cm. long. Fruits few to single on a short peduncle rarely half as long, on slender pedicel sometimes joined below the middle end a little ovata Rose, but the leaves are decidedly different. Guaymas, Sonora, November 2, 1926. No. 22598.

Viscaionia geniculata. Tree-like shrub, 10 or more feet high, tufted stems erect, with smooth grayish-green bark and no thorns. Flowers dull white, about an inch wide and opening widely. Sepals 3-4. Petals 3-4, obovate, palmately ribbed from tip to base and most below, rounded, ¾ inch long, inserted at the base of a dark stipe which is widest below and half as high as wide. Stamens the same insertion, 6-8, twice as long as petals, or a little shorter than petals, on fleshy acuminate and rounded and stout filaments. Ovary white-strigose, 3-4 celled, oval, tipped by a stigma of 3-4 incurved and oblong lobes whose edges are contiguous and form a sphere. Style equals the ovary. Sap not milky. This is my No. 2474. Got at La Paz.

There is an Agave growing on the rocks at La Paz with bluish, thick and very rigid leaves (after the fashion of A. Utahensis) with very coarse and fleshy teeth 1½-2 inches apart, and ending abruptly in a black and hooked prickle ¼-½ inch long. The stalks are slender and cane-like and 10 feet high and few-flowered, in 2-4 bunches. Was just coming into bloom.

Agave. This is the big blue Agave with narrow leaves, so much cultivated at the Cape and Todos Santos. The stems are 4-6 inches thick, and about 30 feet high, with many clusters of glaucous-blue flowers which become yellowish-green when expanded, but the whole plant is conspicuously blue. Leaves 3-4 feet long, with low prickles 1-2 mm. long and an inch apart. The leaves narrow and tapering.

Agave aurea Brandegee. This wild plant abounds on the mesa north of Todos Santos on the auto road to La Paz. The stems are stout, about

10 feet high, with very many clusters of purple-black buds which become golden-yellow in flower. The leaves are 2 feet long and not congested, they even become 4 feet long at times and six inches wide. The prickles are low, a few mm. long, and ¼ to ½ inch apart. Leaves conspicuously lanceolate, also narrowed below but widest at very base. It is a very stately Agave, the most stately of them all. It also grows on the rocks on the eastern slopes of the Lagunas.

Rhachidospermum Mexicanum Vasey. To the last Vasey held that this was not Jouve pilosa, but most everyone else considers them the same. The plant abounds on the Coast from Todos Santos around La Paz.

Nolina Beldingii (?). This grows on slopes of the Laguna mountains in the brush. The leaves are 3 feet long by ½ inch wide, and long and grass-like.

Euphorbia Arizonica has pods a trifle hairy, appendages not lacerate the glands. The seeds are the same. No. 6437 Purpus. Plants with the same name Parish No. 8087 called setiloba by Parish is polycarpa. This is a part of Johnston's type. The same name is Thornber's No. 341 from Wilmot, Arizona, and is Fendleri. Same name (given by Wales as polycarpa) from Imperial valley No. 64700 is polycarpa.

Simmondsia Californica. At Todos Santos I find that pistillate forms are rare except on northern slopes of hills. The plants become 20 feet high, and are very much branched. The fruits range from ovate-acuminate to almost oval-ovate. No such extravagant development is found in this species at the north.

Euphorbia podagrica Johnston is only a form of Fendleri, lacking

Euphorbia perina Wat. is only a form of polycarpa.
Brandegee puts it in E. pocarpa.

Quercus Brandegei Goldman. The type locality for this tree is Miraflores. There it is a big tree 50 to 60 feet high, sprangling out very widely with few and very big branches, has the habit of a white oak. The smaller branches have very smooth old bark. The leaves are shiny above. The cups are deciduous in racemes. The plants were just coming into bloom on the first of March, 1928. The ground was covered with young plants from the last year's crop of nuts. It is the only live oak at Miraflores, and abounds along the river banks but not near water.

In the Cape region are many live oaks. Their native habitat is in the high mountains at the upper edge of the Tropical life zone, but their tough and shiny leaves enable them to exist at much lower elevations, and we find them straggling along the stream lines in a few favorable situations as far down as the sea, but these conditions are always those with a moist soil. At Todos Santos grows a live oak Quercus Brandegei Goldman, in a wash that seems to be the same as the one growing at the Cota ranch and at Miraflores. It is an erectish tree about 40 feet high, with white bark above, which breaks up below into narrow and rough areas. At the Cota ranch it has leaves often oblong and scarcely cut on the margins. The cups have very low warts. The nuts were all gone, consumed by animals.

Fouquieria peninsularis Nash. This species replaces F. splendens at the south but is not always separable from it easily. Splendens has no true trunk but the many canes come out at the ground in tufts, and are seldom larger than walking sticks. Peninsularis has a main trunk below the first branches and is often racemosely branched above with mostly twisted branches. At San Blas Sinaloa and at San Antonio, Lower California, it reached 20 feet high, with a trunk at least a foot thick at base, and with the main trunk 10 feet high. It has the same flaky bark, and is common all the way south of Carbo, growing in the brush along with Cactus and Leguminosae. In winter always in full leaf.

Dalea maritima Brandegee. This grows on the sand spit across the bay from La Paz. It seldom rises more than 2 feet high but spreads along the ground with the lateral branched prostrate and often 6 feet long and slender. Flowers purple and white. Strongly odorous, perennial, and sometimes a little shrubby below, a vigorous grower with the habit of an Astragalus.

Acacia. This genus is badly balled up, containing fleshy-fruited and dat-fruited species.

Diplandra lopezioides H. & A. Standley in Shrubs and Trees of Mexico, page 1075, says of this species: Leaves "serrate." They are not only entire but so figured in Bot. Beech. fig. 60.

Euphorbia Preslii and Brasiliensis rest on very thin lines. The only difference I can see is that Preslii has fine wrinkles on the face of the seed. and Brasilensis has two ribs.

———— ———— This is a red flowered bush 6-8 feet high, erect and very bushy branched from base. The older bark is rough lengthwise. The twigs are glaucous-blue-green, rigid but not spinose. Leaves oblanceolate and almost sessile. Calyx a mere rudiment and truncate. Corolla urn-like, sessile at base of a thick disk 1 mm. high, which is radiantly 10-grooved. Corolla lobos 5, closely reflexed, deltoid, yellowish within, red outside. Stamens sessile at end of tube, with a little tuft of hairs, no filaments. Fruit a spherical and pulpy (1-seeded ?) berry or (?) Corolla falls when ripe. Anthers wide and short. La Paz, February 9, 1928, on the east.

Cereus Allied to Engelmanni. This grows in clumps several feet square, is about 8-12 inches high, and 2-3 inches wide. Spines sometimes 4 inches long and flat below. Fruit very spiny. No flowers. It is a fast grower. This is common at Todos Santos and occurs at La Paz. The Mamillaria also grows in it at times.

Cereus Schottii varies greatly in the thickness of the stems, and rarely has whiskers on the top (then becomes the viejo) and then has been called by another name, but this tendency to have whiskers occurs in all the species of Cereus that become big. Often there are prostrate stems among the others.

There is a Mamillaria with slender stems and conspicuously raised ridges and tubercles that leads one to think it is an Echinocactus. I saw one patch of it that I took to be Cereus eruca on the mesa near Santiago (east of Miraflores). This is the same thing that grows at La Paz on the

east. I took a photo of it but did not get a good one.

Mamillaria Sp. This grows on the rocks at Todos Santos at the north of the town and hangs down 2 feet, and is about 4 inches thick, and has the single hooked central spine. Saw no flowers or fruit.

Mamillaria Heyderi (?) This seems to grow on the mesa toward the sea from Todos Santos. The flowers are ¾ to an inch long, greenish-white. Petals barely fringed. It seems to accord in every way with the species growing near Colnett, north of San Quentin bay, and which I had growing in my garden.

Polygala apopetala Brandegee. This, take it all in all, is the most interesting shrub I saw. In the surprise it produced on seeing it first I can recall nothing more unique than the redbud, Cercis occidentalis, which blazed at me out in the desert of the Grand Wash, Arizona, in 1894. It is the same brilliant red-purple. The stems are 6-8 feet high, and very open and slender and tufted, growing in an inaccessible cliff, with the cane-like stems racemosely branched above, and ending in long racemes, a foot or two long. I also got it later in similar situations at the Cota ranch, but secured specimens at great risk, February 21, 1928. No. 24157. It was too early for fruit at that time.

Jussiaea clavata N. Sp. Near to suffruticosa. Stems inclined to be woody below, 2-3 feet high and ascending and reddish, and pubescent with slender spreading white hairs, as is the whole plant up to the sepals. Stems mostly simple and racemosely flowered above the middle. Leaves soft, 1-2 inches long, elliptical-lanceolate, entire, shortly-acuminate, almost sessile from a narrowed base, 1-nerved and with many close-set and parallel lateral nerves. Calyx lobes accrescent, ovate to lanceolate-acuminate, purplish, 1 cm. long, half as long as the very broad and light-yellow petals. Fruit 2-3 cm. long, linear-cuneate and truncate, becoming clavate at tip by swelling out, about 8-striate, acuminate into a short stipe, ascending. Seeds minute, oval, flattish, with a groove along one side. Growing in wet places, Acaponeta, Nayarit, February 24, 1927, No. 22871. No.

Ludwigia Tepicana N. Sp. Slender and erect shrub 4-6 feet high, with sharply 4-angled stems winged on the angles, smooth throughout. Leaves about an inch long, linear-elliptical-lanceolate to oblanceolate and entire, and with revolute margins acuminate below into a minute petiole longer than the internodes. Flowers all distinctly pediceled, in fruit about 4 mm. long and stout, single in the upper axils, nearly 1.5 cm. long Petals lemon yellow, obovate, very thin and evanescent, about 1 cm. long Anthers linear, curved, splitting throughout and emitting a spherical pollen which is rugose. Anthers on capillary filaments half as long as the petals. Stigma spherical at tip and on an elongated style half as long as petals. Calyx broadly turbinate, 4-5 mm. long and nearly as wide, 8-ribbed, with deltoid and green teeth hardly 2 mm. long, which are not accrescent. Calyx with a spatulate and leaf-like bract about as long as itself. Seeds ½ mm. long, cuneate, 4-angled, and with rather concave sides, light-yellow, many. No. 22874, Tepic, Nayarit, February 12, 1927, along watercourses. Also No. 22875 at Ixtlan, February 19, 1927. I also refer here No. 24290 from Miraflores, February 28, 1928, with almost

linear leaves and somewhat smaller flowers. Also my No. 228, got at Pastorillo, Zacatecas, Mexico, May 2, 1892. Though this has the flowers sessile and a little wider leaves. This is not the same as alternifolia nor polycarpa.

Mamillaria, San Jose del Cabo, January 18, 1928. This plant grows on granite hills along with Echinocactus Falconeri, Cereus, Opuntia, etc. The stems are single or in small tufts of rarely 6. It is a few inches to a foot high, nearly erect, 3 inches wide. Flowers near the tip but never on the tip, greenish-white, ¾ inch long, only partly open. Petals not lacerate, nearly linear, the outer ones reddish and striped in the middle. Fruit linear-clavate, orange colored, ¾ inch long. Central spine shortly and sharply hooked.

Cereus Pringlei Watson. East of San Jose del Cabo, along the road and in bloom. Ribs 10-12, with a wide scallop between. Trunk varies from 6-12 or more inches thick, and 30 feet more or less high, always blunt at tip. Old stems are bald at tip (whence the name calvus), a few individuals have whiskers toward the top (like the viejo cactus). Flowers open in the forenoon, dark-purple on the outside and nearly always closed, when open the inside is white and tips of petals recurved. The fruit is an oblately spherical burr with innumerable yellow spines felted together. There is a central trunk from which branch below the middle, candelabrum-like, a few offsets the same size as the trunk. This has been called Cereus titan, and C. calvus, but there is but one species.

Cereus Thurberi. This trim and neat species has a much smaller trunk, and branches near the base into several to many organ-like pipes (stems) which taper at the tip. The ribs are about 16-20 and close-set, the trunk 4-6 inches wide and sometimes 20 feet high, but rarely over 15 feet high, almost always with a distinct trunk though very short before it branches. It is a very vigorous grower. The aureoles are black and spines black. This is scarce above 3,500 feet altitude on the Laguna mountains. But is the most common cactus south of Nogales.

Echinocactus Falconeri. San Jose del Cabo, January 23, 1928. The fruit is smooth, globular, ¾ inch long, green but at last yellowish, persistent. Aureoles a little woolly, central spine erect, sharply hooked at the end, very much corrugated. The lateral spines are stiff hairs and white. The main spine is darker. Whole plant is bluish-green, plants 2 feet high and a foot wide. This is occasional through the Cape region on dry benches.

Antigonum leptopus Bth. Perianth with parts inserted at base, the three outer larger, and developing in age. Stamens 8, on a raised and purple collar and with apparently abortive inner ones like teeth. Anthers incurved and very wide, yellow. Styles 3, and with horse-shoe stigmas linear and also yellow. Young leaves softly pubescent. No. 24006, San Jose del Cabo, January, 1928.

Plantago hirtella var. annua. N. Var. Plants annual. About 6 inches high and slender. Leaves 3-nerved, linear-elliptical, about 4 inches long, entire and acutish surpassed by the peduncles. Spikes 2-4 inches long, narrowly linear, dense. Calyx lobes strongly 3-nerved and pilose on the

green nerves with flat and long white hairs. Corolla closed, the lobes acutely-ovate and white. In moist places among the live oaks, Laguna mountains, Lower California, March 2, 1928. No. 24403.

Mimosa Mazatlana N. Sp. Apparently allied to M. Ervendbergi Gray. A slender shrub climbing over bushes, with internodes 3-4 inches long, and slender filiform petioles about 3 inches long and divaricate, and similar peduncles a little shorter. Stems sparsely beset with recurved and yellowish prickles. Petioles with closely reflexed and slender hairs or setae. Under surface of leaflets with scattered and appressed setose hairs, upper surface shining and smooth. Pinnae 2, and with stiff stipels at the base. Leaflets two pairs,, the lower pair with one leaflet aborted to a very small one, or even a scale. Rachis produced into a green bract sometimes 1 cm. long. Stipules subulate and stiff. Leaflets appearing as if digitate, 2-2.5 cm. long by 1 cm. wide, obliquely eliptical, acutish, apiculate. The midnerve above the middle, and with 1-3 nerves coming out at its base on the lower side. The leaflets all appear is if twin, the obliquity of the one a complement to that of the other. Pods are spike-like heads, several, flat, and thin and with scattered setae, jointed with 1-3 joints, not winged, about 2 cm. long and 4 mm. wide, inclined to be constricted, strongly apiculate and stiped with beak and stipe oblique and about 4 mm. long, green. The pods show a disposition to twist in age. The flower clusters are axillary below and become paniculate at the ends of the long stems. All the species of Mimosa are so very poorly described that there is no certainty about the species. The original authors of the species never seem to have thought it a matter of any moment to really describe their species as they could have done. No. 22447, Mazatlan, Sinaloa, Novembr 21, 1926, and No. 22446, November 29.

Mimosa aspera N. Sp. Slender shrubs 6-10 feet high, with gray bark, with scattered reddish spines flattened somewhat and sometimes hooked, and about 4 mm. long, the leaf rachis, often spinose also. Leaves with 3-4 pairs of pinnae and about 10 pairs of leaflets, which are oblong, about 1 cm. long, thick and shiny, acute, with midrib above the center and at base with two additional veins below it, and the base oblique. Pods many in a dense head, about 3 cm. long and 8 mm. wide, flat, straight, strongly apiculate but very obtuse, with the surface covered with subulate spines 2 mm. long, which are nearly round in cross-section, the nerves on the valves very thin and rarely spinose on the very edge, the septum not pointed. Seeds about 10, at maturity the pods open readily, showing the smooth interior. Stipe if any very short.

Astragalus ervoides H. & A. Bot. Beech. 417 1841. A. Lagunensis Jones. It would seem that this apparently impossible puzzle is at last solved. The conditions, ecological, are such that it is practically certain that it is my species above given. There is only one species of Astragalus known in the region of Tepic in the high mountains and this was the enigma found by Lay 102 years ago on his trip to Tepic from San Blas. No other man since seems to have discovered it in the region. In his botanizing on the San Francisquito mountains of Lower California Brandegee collected a plant which he sent me for identification, and which I

named Astragalus Francisquitensis N. Sp. Later he sent me material from the Laguna mountains, Lower California, which I named A. Lagunensis N. Sp. The material was sufficiently different to warrant its being placed as a variety of the other. Now as to synonymy. Sheldon in Minn. Bot. Stud. 9 66 names it A. apertus Sheldon and puts it among the Uliginosi. Then on page 172 he gives it another name, Tepicus, and puts it in the What-is-its. All this was done because Turcz. created the name ervoides in 1838 for A. miniatus, Sheldon adhering to the stupid slogan, "Once a synonym, always a syononym." If the name ervoides is to be abandoned then A. apertus Sheldon must stand. All Sheldon knew about the species was what is in Bot. Beechy 417. When I came to name Brandegee's plants A. ervoides was in the discard asa species, impossible to identify. But since then I have been over the ground and collected the species. And the striking similarity of my species with Lay's is apparent. Lay's species is described as follows: "I Astragalus (Sect. Ciceroideae) ervoides; puberulus, caule gracili elongato-ramso, foliolis 15-17, remotis, linearioblongis, obtusis, stipulis lanceolatis, parvus, pedunculis axillaribus folio longioribus racemosis, racemis 10-12 floris, Calyce brevi-ornato oblique obtuse 5-dentato dentibus brevibus subaequalibus (pedicellisque) nigris, corolla (flava) calycem subduplo, superante, leguminibus linearibus deflexis curvatis acutis glabris."

"Hab. San Blas to Tepic. Our portions of this plant measures less than a foot, slender, they are branched and straggling, herbaceous. Leaflets about half an inch long. Flowers of the same lentgh, soon reflexed. The short cup-shaped calyx, with its obliquely 5-toothed mouth, has a few dark-colored short hairs scattered over the surface, yet so as scarcely to affect the green color; but the short teeth and the pedicels are quite black."

Astragalus ervoides Bth. Probably winter annuals, with central stems often erect and a few inches high, but mostly much branched from the crown into filiform and procumbent stems after the fashion of A. Nuttallianus which are 1-3 feet long and simple or sparingly branched above, and then with long internodes, whole plant even to the black-hairy calyx minutely appressed-strigose, except the upper side of the leaves, which is smooth. Stipules conspicuous, linear-subulate, adnate, not connate, reddish and hyaline, not over 1 cm. long, the floral bracts similar but shorter. Leaves linear, with about 8 pairs of broadly oblanceolate to elliptical, cuneate and retuse to truncate leaflets, about ½ cm. long. The leaves with short petioles or the upper sessile, widely spreading. Flowers racemose-spicate, on long and capillary peduncles, mostly surpassing the leaves. Pedicels almost none. Flowers about 5 mm. long, with white base and purple tips, narrow. Calyx tube short-cylindric but a little contracted below, hyaline, about 2 mm. long and twice as long as the linear-triangular teeth. The petals have been described when fresh above. Pods are linear, acuminate, nearly straight, sessile, spreading, smooth, triangular-cordate in cross section, about 1 cm. long by 2 mm. wide, deeply sulcate dorsally, 2-celled, with sharp and raised ventral suture. Pods much the shape of A. parvus. This corresponds closely with my A. Lagunensis, and I doubt that Francisquitensis is sufficiently different to be worth

varietal rank.

My notes taken fresh March 2, 1928, on the Laguna mountains, 3,500 feet elevation, are that the species grows on gravelly slopes among the live oaks. Stems prostrate after the first few inches, very slender, from an apparently winter-annual root. Flowers with banner purple, and with the white spot rectangular and veined with purple, with sides reflexed somewhat. Wings fully 2-3 mm. long, linear below, obtuse, much rounded, then oblong lanceolate, not flaring, connivent at tip and purple there, 2 mm. wide at tip. Pods 2-celled, linear-acuminate. Calyx a little laterally flattened, nisgrescent. The species is fully described in my Astragauls, page 267.

Astragalus Francisquitensis Jones is likely to be A. ervoides H. & A. There is no other species that it would be so near, particularly the var. Lagunensis Jones. Very likely a comparison of the type ervoides if that is extant would settle the matter. If that is not possible then ervoides must always remain a puzzle. So far no specimens of my species have been found on the main land, and there is no likelihood of any being found "between San Blas and Tepic" except on some high mountain adjacent to the route to Tepic from San Blas. I do not know of any such mountain, but near Tepic some of the mountains seem to go up into the live oaks. I have not yet been on them. The species might well be called ervoides—vetch-like.

Stylosanthes prostrata N. Sp. Stems prostrate from a woody root, forming close mats 2-3 feet in diameter, rather rigid and freely branched throughout. Whole plant glutinous-hairy, with slender gland-tipped hairs which frequently have 2-3 swellings like glands below the tip, other hairs are slender and without glands and mixed in among the rest, the margins of the leaves and bracts are also beset with prickle-like hairs from wide and pustulate base. Nearly every node has a peduncle like branch 1-3 inches long terminating in a leaf and a sessile spike 1-2 cm. long. Leaves about 2 cm. long, of 3 leaflets on short petiolules, the proper petiole being nearly as long as the lateral leaflets, which are slightly shorter than the terminal one, which is about 1 cm. long and varies from oval to oblanceolate on the same plant, and always with an oblique and yellow spine-like apiculation. Stipules about as long as the lateral leaflets, hyaline and 3-nerved with raised and rib-like nerves and coming together above in a linear to subulate and rather rigid green and leaf-like tip as long as the body, the whole very pubescent. Bracts densely aggregated and overlapping, each subtending a flower, deltoid in outline and about 1 cm. long, trifid nearly to the middle into 3 green lobes, otherwise hyaline but strongly green-nerved, the lateral lobes inclined to be recurved and acerose and subulate, the central one linear and rather leaf-like but also acerose. Flowers exserted slightly, golden-yellow, 3-4 mm. long on slender pedicels. Calyx short and split into ovate to trangular lobes nearly to the base, reddish and smooth. Fruit appears sessile in the calyx as though there were two sets of flowers, one fertile and the other not. Fruit 2 mm. long, broadly oblong and truncate above, hyaline, terminating in the upper corner in an apiculation made by the tightly coiled style. Face of fruit with

a central green rib connected with the lateral nerves by cross veinlets and raised, forming an open net work. The older leaves seem pitted with dark areas whose sides have many radiating and glass-like lines. No. 24269, Todas, Santos, February 15, 1928, and No. 24002, at San Jose del Cabo, January 18, 1928, on dry mesas among brush.

Leucaena nitens N. Sp. Slender shrub about 10 feet high, smooth and shining even to the pods. Leaves little longer than wide, on slender petioles, 2-4 cm. long, which have a gland below the pinnae, but no other glands. Pinnae 3-4 pairs, these and the leaflets even-pinnate. Leaflets about 4 pairs, ovate to oval, about 2 cm. long by 1 cm. wide, acutish below and obtuse and apiculate above, green and shining above and lighter below, thick but not venose, the upper ones the largest, contiguous. Pods flat, linear, about 1 dm. long, 1.5 cm. wide, chestnut-colored, uniform in outline, shortly-acute at tip and acuminate into a stipe 1 cm. long, with thin valves showing the outline of the seeds through, the surface with low and slightly raised nerves which are lateral, ascending, irregular and meshing in small areas in the middle. Seeds 5-7 mm. long, oval, flat, shining-chestnut-colored, about 15 to a pod. Pods open readily but valves do not curl. No. 22465, Mazatlan, Sinaloa, November 20, 1026, on hillsides.

Diphysa vesicaria N. Sp. Slender shrubs 6-10 feet high. Inflorescence a dense swab at the ends of the branches and very glutinous-short-hairy and without spines. Leaves rather tufted at the ends of branches, about 8 cm. long, pinnate, with 5-7 pairs of leaflets on a strongly sulcate rachis and petiole. Leaflets oblong, truncate to rounded at tip, about 2 cm. long by 8-10 mm. wide, flat, inclined to be acutish at base, green above and lighter below and more pubescent there, minutely pubescent all over. Flowers yellow, about 1 cm. long, racemose on the upper end of a slender peduncle, few. Calyx glandular-hairy, the tube contracted and 10-striate, abruptly enlarged at throat, and with triangular lobes spreading and twice as long as tube or more. Fruit on a stout stipe as long as calyx, the body when fully developed about 5 cm. long, and 1 cm. wide, very much inflated with collapsing and tissue-like walls, mostly of 2-3 sections separated by constrictions, which are oblong and with irregular outline, upper section conspicuously beaked. No. 22986, Acaponeta, Nayarit, March 1, 1927, on hillsides.

Phaseolus atomiferus N. Sp. Slender climber, 10 feet or more long, stems twining and retrosely and densely short-pubescent with white hairs, which also cover the entire plant, being densest on the under side of the leaves. Leaves on petioles about an inch long and stout. Leaflets 5-8 cm. long and about half as wide, cordate-rhombodial-ovate-acuminate, with conspicuously raised veins below and atomiferous with minute red and shining dots below. Fruit oblong, flat, about an inch long by half an inch wide, contracted at base and apiculate at tip, the valves twisting on opening and exposing the 1-2 seeds which are shining, globose-oval, 5 mm. long, the upper half black and the lower scarlet, and persisting on the ventral edge. The pods are racemose on a stout rachis, and several. Peduncle still stouter and an inch long. Flowers not seen. Growing

along with Phaseolus atropurpureus, over bushes. No. 24278, Todos Santos, on mesas at the north, February 17, 1928.

Cracca lupinoides N. Sp. Erect shrubs 4-6 feet high, growing in clumps. Stems densely woolly-hairy with very short and ascending hairs which are yellow. On the inflorescence even to the banner densely felted. Stems racemosely branched above. Leaves a foot or less long, with normally 4 pairs of leathery leaflets 10-15 cm. long by 3 cm. wide, felted short-hairy below and shining above, conspicuously about 18-nerved below and reticulated below, acute to very obtuse and rounded at tip, mostly truncate below, with edges wavy as if subserrate, the lowest pair much smaller and appearing as if stipular but above the joint on petiole. Petiolules very stout, and about 5 mm. long. Inflorescence an elongated compound raceme with the laterals very short and few flowered, the flowers on pedicels about 1 cm. long. Bracts very small. Flowers purplish on banner and keel tip, and whitish in the margins, about 1.5 cm. long. Calyx and banner very yellow-woolly, teeth triangular and about as long as tube. Fruit spreading, very yellow-woolly, about 5 cm. long by 5 mm. wide, rounded, but slightly flattened, linear, the tip a triangular apiculation. This would seem to belong to the Toxicaria section but leaves quite different. Among the live oaks at El Tigre mine, Acaponeta, Nayarit, No. 23016, March 1, 1927.

Cracca collina N. Sp. Shrubs 3-4 feet high, and rather short-branched. All but the pods hoary with short and dense pubescence. Pods shaggy-hairy with long and yellow hairs. Leaves hardly 1 dm. long, of 3 leaflets, 5-7 cm. long and 2 cm. wide, obtuse and rounded or truncate at both ends, the veins many and raised as in lupinoides, and the same shape, rather densely pubescent above but less so than below. Fruiting spike about 1 dm. long, dense, of several contiguous pods hardly 1 cm. long, rounded and ascending and very pilose, and about 5 mm. wide. General appearance that of lupinoides, but inflorescence different, pods much shorter, and leaflets only 3. No. 23015, Tepic, Nayarit, February 15, 1927. On hillsides.

Cracca axillaris N. Sp. Slender shrubs 4-6 feet high, widely branched racemosely and with sub-digitately branched axillary racemes about 1 dm. long. Stems yellow-felted above as are the leaf-rachis and petiole and petiolules. Leaves hardly 1 dm. long, of 3 pairs of leaflets, the terminal one much the largest. Petiolules about 4 mm. long and stout. Petioles rarely an inch long, and stout. Leaflets elliptical, 4-6 cm. long by 2 cm. wide, wavy-margined, thick, dark-green above and slightly hairy, and rather shining, lighter colored below and yellow-pilose on the veins and veinlets which are raised, rounded at tip to acutish at times, at base truncate to shortly-cuneate, overlapping. Racemes almost sessile, producing just above the base two laterals, and sometimes with an accessory one a little higher up, which are shorter than the central one which is racemosely flowered almost to the base. Flowers about 1 cm. long, purplish on the margins, the banner very yellow-hairy as in lupinoides and so is the calyx. Calyx lobes subulate and shorter than the tube. Pods short-hairy, conspicuously flattened and wavy margined, acuminate with a long

beak, and very shortly stipitate. No. 23022, El Tigre mine, Acaponeta, Nayarit, March 1, 1927, among the live oaks. This seems related to lupinoides in the leaves, but inflorescence entirely different.

Dalea Blasiana N. Sp. Slender and erect and widely branched shrub with long branches which are gray with very short and spreading pubescence, and internodes much longer than the leaves. Leaves gray with rather appressed hairs, becoming scattered above. Stipules subulate and colored. Leaves 2-3 cm. long, on filiform petioles about 1 cm. long. Leaflets 5-11, oval-obovate, rounded to retuse at tip, with many black or reddish glands, flat. Flowers in dense and almost sessile spikes 2-3 inches long which at first are silvery-silky, and black with age. Petals purple and almost as long as the capillary calyx lobes which are about 7 mm. long (including the calyx tube). Bracts with long and capillary tips, deciduous. Calyx tube 2-3 mm. long, with evident glands, silky-villous, open-capanulate, the lobes plumose. Fruit deltoid-triangular, with subulate tip produced on one corner, smooth below and long-villous above. One seeded. This plant is easily mistaken for a Lespedeza. No. 23040. San Blas Sinaloa, February 1, 1927. Plant about a yard high, growing on slopes.

Lotus ramulosus N. Sp. Allied to Hosackia Bryanti Brandegee. Prostrate and woody rooted perennial with very slender filiform stems a foot and a half long, and sparingly branched throughout and prostrate, forming open masses 2 to 3 feet in diameter, or spreading upward on bushes. Green but slightly hairy throughout. Upper part of stems with single umbels in the axils on capillary peduncles 2 inches long. Leaves with 1-3 pairs of leaflets about 1 cm. long. Leaflets linear but acuminate at both ends, and so having an elliptical outline, 1-2 mm. wide. Stipules and bracts reduced to minute deltoid brown scales, or a mere rudiment, but not glands. Flowers about 15 mm. long, with the bright banner dark-reddish-purple at tip, and wings and keel white. Flowers not showy, much scattered, one to two on the ends of the very long peduncles and on pedicels about 1 mm. long. Calyx about 7 mm. long, the subulate lobes half the whole, reddish, sparsely hairy, very hairy-cilate on the margins and edges of the teeth. Pods 1.5 cm. long and 2 mm. wide, ashy and becoming smoothish, arched a little toward tip. This has the general habit of rigida, but is not silky-villous as in Bryanti, and pods wider, and leaflets never lanceolate. Growing in open places along with Astragalus Lagunensis among live oaks at 3,500 feet altitude in the Laguna mountains. March 1, 1928, No. 24271.

Ononis crotalariodes N. Sp. Perennial from spreading roots, erect, a foot or two high, leafy and with short internodes. Stems flexuous, striate, spreading-strigose with flat, jointed, twisted and glandular hairs, the gland terminal and oblong. Whole plant similarly pubescent except the white petals. Leaves 3-4 inches long, of about 7 pairs of elliptical to oblong leaflets about 1 cm. long, which are seldom opposite, conspicuously serrate, finely raised-nerved. Stipules deltoid, green, deeply 2-5-toothed, parallel veined, fully 6 mm. long. Flowers 6-8 mm. long, single in the axils, on a stout peduncle 2-bracted in the middle, S-shaped and reflexed,

and about 1 inch long. Calyx lobes about as long as petals, triangular-acuminate. Pods sessile, membranous, 2 cm. long by 1.5 cm. wide, greatly inflated and cross section round, longitudinally oval, sharply deltoid-apiculate, sutures about equally arched. So far as I can find there is no species of Ononis native to Mexico. O pinnata is the only species approaching this in relationship. No. 23039, Tepic, Nayarit, February 14, 1927, in fields.

Cassia rotundifolia Pers. A prostrate herb from a woody root, about a foot high. Stems slender, racemosely branched below only, with internodes less than an inch long, and shorter than the leaves, sparsely pilose with long and spreading and straight hairs, with a few shorter glandular ones intermixed. Bases of the leaves similarly pubescent, but pedicels smooth, and pods minutely puberulent. Stipules triangular-ovate-acuminate and green, rather rigid, strongly 7-9 nerved and nerves parallel, and raised, 5-7 mm. long, closely appressed. Leaf with stout petiole about 4 mm. long, of two leaflets sessile and jointed to petiole. Leaflets apparently never united below, obliquely elliptical-oval and rounded, about 2 cm. long and 1 cm. wide, the mid-nerve not in the middle and having 3-4 nerves arising at the base on the outer side, all nerves raised and forming a raised network only near the margins. Leaves scarcely reduced above. Flowers single and yellow, about 5 mm. long, on capillary peduncles 1-2 inches long, and spreading. Legumes neary stipeless, linear, about 3 cm. long by 4 mm. wide, flat, many seeded, obliquely apiculate at tip and obliquely short-acuminate below, mostly straight, the valves opening and twisting as in Lotus. Seeds short-rectangular, about 3 mm. long, with square base, and tip apiculate on one corner, gray, close-set. This may not be a Bauhinia, but I know no other place to put it than here. No. 22483, Mazatlan, Sinaloa, November 20, 1926, growing in open places on slopes. This has the general characteristics of C. diphylla.

Aeschynomene vigil Brandegee. Shrubs about a yard high, rather intricately short-branched much as in Amorpha canescens, the leaves being clustered on the last few inches of the hoary twigs. Pubescence closely appressed on the stems, and dense, much less so on the leaves, of slender and flexuous hairs. Leaves about 2 cm. long, rather hoary, of 4-5 pairs of oblong leaflets, about 8 mm. long, obtuse to emarginate, with the midrib off from the center, and the central leaflets the largest, the terminal one often twin. Flowers in very short axillary racemes, 1 to 3, sessile near the ends of capillary peduncles, which are not over 1 cm. long. Flowers very dark-purple, with yellow-tipped keel, the banner hairy and about 5 mm. long, and very broad. Calyx strigose, with triangular-subulate lobes. Legumes of 1-3 joints which are half-rhombodial, the stipe side straight, reticulated, sparsely short-hairy, almost contiguous, about 5 mm. long and 3 mm. high. No. 24260. Miraflores, Lower California, February 28, 1928. This plant is very poorly described by Brandegee in Proc. Cal. Acad. Ser 2 Vol. 3 128.

Aeschynomene glomerata N. Sp. Near to A. petraea Rob. A shrub 4-6 feet high, branched above in fascicles. Stems slender and smooth, on both sides, which are very obtuse or rounded at tip and oblique at

base, venose and with midrib in the center, 2-2.5 cm. long and about 8 mm. wide. Old leaves falling as the flowers come out. Petioles about 2 cm. long. Flowers golden-yellow, not striped, about 1 cm. long, in short compound racemes an inch or two long, which are densely clustered. Stipe, pedicels and axis densely spreading-short-hairy. Calyx thin and light-green, about 5 mm. long, turbinate, the teeth about half the whole, rather oval, becoming apparently triangular and spreading in fruit, somewhat pubescent. Fruit of about 4 joints, 8-10 mm. long by 7-8 mm. wide, half-oval to oblately so, the ventral one somewhat arched, becoming glabrous, but puberulent when young, finely reticulated, the terminal one with a conspicuous triangular beak, the basal joint about as long as the stout and straight stipe. No. 23057, Acaponeta, Nayarit, March 1, 1927, at El Tigre mine, growing among live oaks. The conspicuous thing about this species is that is a rather tall and slender shrub, with mid-nerve of leaflets in the middle, and leaves falling as the flowers come out, leaving the stems leafless, and the large tufts of golden-yellow flowers. Ae. petraea Rob. is poorly described, and is said to be annual. Standley in the Shrubs and Trees of Mexico says this species is a shrub. Ae. glomerata is a closely related species at least.

Inga megacarpa N. Sp. Large shrub or small tree about 20 feet high. with rather slender branches and gray bark, leaves at first very thin and papery, becoming about 6 inches long and nearly as wide, with about 5 pairs of twin leaflets arranged on the rachis alternately, and then light-green, smooth and shining on both sides and with raised mid-nerve, rather leathery, about 7 cm. long by 3 cm. wide, elliptical, obliquely and triangular-acute, each leaflet in the pairs appear almost as the half of an oval, leaflets split in the middle. Mature pods rarely more than two on a woody peduncle about an inch long and over ¼ inch thick and similar to the branch from which it arises. Pods 10-12 cm. long by 4 cm. wide, and 3 cm. thick, chestnut-colored, oval in cross-section, with the ventral suture raised as a ridge, obliquely rounded at both ends, the surface rticulated and shining and smooth. Walls about 3 mm. thick and very hard and woody. Interior of pod is filled with a cellular pulp which incloses the seeds. Seeds about three, black and smooth, somewhat flattened and about 1 cm. long, and round. Pods very heavy, a little arcuate, that is not symmetrical. The leaves of this are constructed much after the fashion of Pithecolobium dulce. No. 23012, Acaponeta, Nayarit, February 25, 1927. Growing on hills.

Phaseolus sanctorum N. Sp. This species has the pods more resembling Phynchosia than is usual, but the seeds are several, which would throw it in Phaseolus. A slender perennial, climbing over bushes, a yard or more long and with elongated internodes and inclined to have two peduncles in the axils, sparsely ashy-pubescent at least when young. Leaflets 3, very broadly rhomboidal and about as broad as long, fleshy and with broadly cuneate base, acutish, triple to quintuple nerved, on petioles hardly longer than the terminal leaflet. Peduncles longer than the leaves, striate, one to few flowered. Flowers not 1 cm. long, yellowish but with tips somewhat colored. Calyx almost rotate and very broadly short-lobed.

Pods falcate, 2 cm. long, inclined to be a little wider above, about 5 mm. wide, somewhat flattened, smoothish except on the margins, very shortly-stipitate, about 6-seeded, triangular-acute obliquely, broadly linear. Valves closely twisted in age after splitting off. Seeds nearly round, about 3 mm. long, flattened laterally and with margins cross-ribbed, yellowish. No. 24141, Todos, Santos, February 19, 1928.

Caesalpinia Blasiana N. Sp. Slender shrub with gray bark, with short branches. Leaves 1-2 dm. long and wide, dark-green above and somewhat lighter below, smooth, except when young, and then with very short hairs and minute glands on petioles and rachis and pedicels. Plant unarmed. Leaves even-pinnate, with 2 pairs of pinnae which have about 4 pairs of ovate to ellipitcal leaflets 2-3 cm. long, but 1 cm. wide, rounded at tip and shortly cuneate at base, strongly 1-nerved. Flowers few, in racemes in the axils of the leaves, on pedicels 1-2 cm. long, ascending. Pods about 6 cm. long by 3-4 cm. wide, very flat and chartaceous, with strong borders, rounded at tip and very shortly-cuneate at base, on a stout stipe about 5 mm. long, chestnut-colored, smooth and shining, splitting tardily along the sutures, with 2 seeds, flattened and about 1 cm. wide. This seems to be related to C. platyloba Watson. No. 22987, San Blas, Sinaloa, January 28, 1927.

Acacia Mazatlana N. Sp. Slender shrub, several feet high, erect and widely branched, spineless, copiously leafy with smooth leaves about 2 dm. long, evenly bipinnate with 2-3 pairs of pinnae, and the pinnae with 3 pairs of diamond-shaped leaflets which are shining above and lighter colored below and veiny, 3-4 cm. long by 1.75 cm. wide, shortly acuminate to acute at both ends, with a few scattered hairs in the veins and base. Petioles rather stout, about 4 cm. long, glandless or with minute and scattered papillate as if glands. Stipules minute. Inflorescence a raceme of umbels, the lowest umbels subtended by small leaves. Peduncles of the umbels about 2 cm. long, horizontal. Umbels about 6-fruited, the stamens reddish and innumerable and free. Flowers not seen. Pods very flat, 1 cm. long by 1 cm. wide, oblong, with often wavy outline, flattened between the seeds, shining, apiculate at tip, and cuneate at very base, tapering into a stout stipe 1 cm. long. Valves splitting off flat through a part of the stipe. Seeds about 6, 3 mm. long, nearly round, mottled, brown. This has pods much like those of A. filicina, but leaflets entirely dissimilar. No. 22430, Mazatlan, Sinaloa, November 20, 1926, on hills. This seems to belong to the class of A. Rosei Standley but apparently quite distinct.

Lupinus Lagunensis N. Sp. Section Platycarpos. Perennial, about a foot high, erect, smooth except for a few scattered hairs on the stems and leaves. Petioles filiform, 2-3 cm. long, a little larger than the leaflets. Stipules small and subulate and mostly attached to base of petiole. Leaflets about 5, oblanceolate, about 2 cm. long, apiculate at the rounded tip, acuminate below, 3-4 mm. wide, thin. Peduncles terminal, 2-4 inches long. Bracts small, subulate, deciduous. Pedicels filiform, about 5 mm. long, ascending. Flowers about round, nearly 1 cm. long, white and with bluish borders. Calyx deeply lobed, the upper lobe with wide sinus to the middle and with triangular lobes as long as tube, lower lobe entire and

green. Banner oblately round, 5-7 mm. long, with sides reflexed to the middle, a little shorter than the wings and keel which are very broad. Pods oblong, shortly-acute, a little contracted between the seeds, 2-ovuled, sparsely hairy, flat. No. 24270, Laguna mountains, March 2, 1928, growing along river bed. A unque member of the Platycarpos section.

Lupinus Bartolomei N. Sp. Annual, growing in tufts from a single root, 3-4 feet high and wide, erect, much branched below. Stems flexuous, terminating in a single raceme 1-2 feet long. Leaves light-green, almost smooth except for a few white hairs on the nerves, about 5 cm. long, on slender petioles a trifle longer than the leaflets. Leaflets 2-3 cm. long, oblong-oblanceolate and rounded at tip, and acuminate below, thin. Bracts subulate, thin, deciduous, 4-5 mm. long. Pedicels hoary with appressed white hairs, about 5 mm. long, filiform, ascending. Flowers about as broad as long, 5 mm. long, white with margins tinged with purple or pink. Calyx with upper part hyaline and deeply and broadly cleft, the lobes much longer than the tube. Lower lobe green and entire. Petals smooth, the banner oblately rounded and with sides closely reflexed, a little over half as long as the wings and keel. Wings very broad, net-veined at the ear. Keel the half of a square. Flowers very many in a long raceme, inclined to be whorled. Pods ascending, 2 cm. long by 5 mm. wide, flattened, 5-seeded, sparsely short-shaggy, constricted between the seeds, flat- and deltoid-beaked. Seeds rounded, flattened, mottled with purple areas, about 3 mm. long. The first impression of the plant is that of an exaggerated L. concinnus without the pubescence, the pods being similar, and the color of the flowers the same, but the erect and bushy habit quite different. Growing in drifting sand at the crossing above San Bartolomo and at the springs near by. No. 24163, February 27, 1928. Plants probably nearer L. affinis.

Lupinus rotundiflorus N. Sp. Stout and tufted perennials from a woody root. Softly and rather sparsely short-hairy throughout except the smooth petals, on the stems are some longer silky hairs, the leaves being little more than finely puberulent and greener above. Very leafy and erect plants with thick stems branched above. Petioles 2-3 times as long as the leaflets, sulcate. Leaflets 3-5 cm. long and about 1 cm. wide, narrowly elliptical, apiculate at tip and shortly acuminate below, about 7, strongly ribbed, very many. Racemes very dense, rarely 6 inches long, on short, striate and stout peduncles. Stipules linear, grown to the petioles for 3-4 mm. in length, the rest free, 2 cm. long. Flowers round, blue, 1 cm. long. Calyx deeply cleft, almost to base, and lobes entire. Pedicels 3 mm. long and slender. Bracts setaceous, about 1 cm. long, deciduous. Banner oblately round, a little shorter than the wings and keel, which are about 7 mm. wide. Young pods reflexed, yellow-strigose with appressed hairs. No. 23041, Tepic, Nayarit, February 10, 1927, on hillsides.

Phyllanthus orbiculatus Muell. No. 23 Jones, Colima, Colima, July 5, 1892. Though this is not in fruit it so closely resembles this species that I refer to it here. The species has not yet been reported north of the Amazon. Phyllanthus Pringlei Wat. P.A.A. 26 147 appears to be the same. This also was not in flower or fruit.

In Brandegee's Phyllanthus peninsularis Erythea 7 8 1889, got by Anthony as his No. 364, we have specimens of the type labeled in Brandegee's handwriting, there appear to be two species under this name in the type. Standley refers P. peninsularis to P. Galeottianus. A part of the type is manifestly P. Galeottianus, but most of Brandegee's description is taken from the rest of the material and seems to be a distinct species and shqld stand. The chief characters are in the oblong-ovate leaves, sharply acute and widest below the middle, in the pods being subtended by 5-6 nearly orbicular and green and thick and leaf-like calyx lobes about 4 mm. long, appearing as if a whorl of leaves, and in the sharply triquetrous seeds having flat faces with irregular worm-like cross ridges. This is my No. 24489, got at the first ranch out of Todos Santos, on the road to La Paz, and just opposite the house at the south. P. Galeottianus is my No. 24485, got on the slopes of the Laguna mountains, March 2, 1928. Both species grow about a yard high, forming inconspicuous bushes.

Euphorbia eriantha Bth. The plants referred to this species by Brandegee do not accord with the description in Bot. Sulph. 51 in several particulars, but Brandegee collected the species in the type locality in fine condition, and his specimens correspond well with my own from Todos Santos. The plant is a woody rooted perennial, a foot to a foot and a half high, from a thick base. The leaves are 2-3 inches long, and mostly 2 mm. wide and entire and acuminate or triangular-acute, flat, and with scarcely a petiole, the floral ones inclined to be a little thickened at base and pinkish. There are many floral ones in a whorl which form the conspicuous part of the plant, there are a few stem leaves lower down but inconspicuous. The flowers are about 3 mm. long and hardly reach the base of the fruit at maturity. The appendages hardly 1 mm. long and rather rudimentary, the whole flower hoary with rather dense and very short hairs. The pods are exserted a trifle from the flower on a stipe, and are 6 mm. long by 3 mm. wide, nearly round in cross section, but 3-sulcate, blunt, oblong, ashy with closely appressed and very short hairs, and pendulous or spreading. The seeds are also oblong, 3 mm. long by 1.5 mm. wide, a little flattened and obscurely 3-sided and with rounded edges, a little narrower above than below, with straight sides, and raised white blotches which under a high power show pits, blunt at both ends. The hilum is excavated a little and with the caruncle raised on a short pinnacle, and flat and cellular, and round-reniform in outline and about 1 mm. wide, and is easily broken off. This is my No. 24107 from Todos Santos, February 12, 1928, growing in waste places or open spaces. I have seen it at the Cape and La Paz. It is said to contain a large quantity of rubber.

Euphorbia geniculata Ortega. Annal, erect and with widely spreading branches from the base. Leaves 2-3 inches long, alternate, mostly smooth but ciliate on the margins, conspicuously hastate in the middle with upturned teeth, then mostly below tip are two broad sinuses, and then again sometimes hastate at base but with smaller teeth. Lighter colored below and inclined to become reddish above, on petioles about 1 cm.

long. Flowers small, in a flat and terminal head, much shorter than the stout stipe of the ovary. Fruit so deeply divided as to form almost three follicles which are smooth, somewhat laterally flattened and with elliptical cross-section, and almost reniform in outline. Seeds oval-ovate, acutish, almost round in cross-section but with three obscure keels, truncate at base, the hilum depressed, surface covered with minute warts or tubercles. Seeds a little over 2 mm. long and 2 mm. wide, dark-reddish. This plant is allied to E. heterophylla, but the leaves are quite different, and the seeds different. No. 23325, Tepic, Nayarit, Februry 14, 1927, in waste places in fields, appearing as if at one time an immigrant. The poor description of the species in DeCandolle Prodromus makes it uncertain if this is the species, but the seeds are similar. Hemsley also mentions the species as occurring in various parts of eastern Mexico.

Euphorbia gladiosa N. Sp. Low shrubs a foot or two high, but blooming the first year, dichotomously branched below, and stems inclined to be racemosely branched above. Smooth and shining throughout, inclined to be erect. Leaves opposite, about an inch long, rather rigid and flat, greenish and with a long central and purple blotch above, lighter colored below, an inch long by rarely more than 5 mm. wide, normally triangular-acuminate from a very oblique and half-cordate base, rarely a little serrate on the bulge below, in the younger plants the leaves are sometimes linear. Stipules setaceous and lacerate and white. Stems very slender and toward the top becoming capillary. Lower cymes rather dense and on filiform peduncles an inch or two long and either in the axils of leaves or opposite a leaf when one is wanting. Flowers normally half a dozen in a head or cyme and the cluster subtended by two leaves. Usually there are two clusters of half a dozen flowers, one cluster on each side of a single long-stipitate involucre which is red, obpyramidal as in Eriogonum umbellatum, and 2 cm. long, and with tips ciliate. Appendages orbicular, entire, very white or reddish and hardly 1 mm. long, about one-third as long as involucre. Fruit smooth, deeply 3-lobed and with rounded edges, about 2 mm. long, slightly exserted. Seeds about 1 mm. long, oblong acute, square in cross-section, with rather sharp angles, with about 6 wavy and anastomozing cross-ribs which form rather deep pits, and which go through the angles. The general habit reminds one of E. corollata, but not so erect. Lower stems reddish. No. 22613. Guaymas, Sonora, November 2, 1926.

Euphorbia strigosa H. & A. Bot. Beech. 310. This very poorly described species is somewhat better described by Boissier in DC. Prodromus Part 15 2 p. 73, but even there is unsatisfactory. Whether my plant belongs to it I do not know. Erect perennials from running rootstocks. Stems 1-2 feet high, erect, simple, slender, minutely pubescent above. Leaves alternate, ascending, 3-4 inches long by rarely an inch wide, oblong-lanceolate, acuminate, mostly acuminate below, on a stout petiole rarely 5 mm. long, entire, rough with a minute and appressed white pubescence. Stems ending in a single black-purple cluster subtended by 3-5 brilliantly colored red-purple bracts which are 2-4 inches

long and lanceolate and either wholly colored or half colored and then green to the tip. Involucres about 3 mm. long, broadly campanulate, very dark, and with rudimentary glands. Fruit exserted twice as much as the length of the involucre, depressed-globose, about 5 mm. long, deeply 3-lobed, with divisions rounded on the back and not keeled, smooth. Seeds globose-oblong, 3 mm. long, round and not angled, gray, with slightly raised areas, shining. This grows scattered among the grassy slopes. No. 23310, Tepic, Nayarit, February 14, 1926. In case this proves to be different from E. strigosa it may bear the name E. nigro-purpurea.

Euphorbia floccosiuscula N. Sp. Plant annual and prostrate, with capillary stems intricately branched, and with rather short internodes. Whole plant softly pubescent with excessively fine and cobwebby hairs which are widely spreading and inter-mixed with gland-tipped ones and about 2 mm. long, much as in E. villifera. Leaves elliptical, oblique, opposite, the largest about 5 mm. long by 2-3 mm. wide, entire, and rounded, most of them very small. Flowers axillary and single, minute, red, on slender pedicels. Involucres narrowly cuneate in outline, and about 2 mm. long. Appendages small and lacerate. Fruit slightly exserted, nearly as long as wide, emarginate, deeply lobed and with angles rather sharp, about 2 mm. long, pilose. Seeds reddish, oblong-ovate, ½ mm. long, acute, sharply angled and with concave sides a very little rugose. Plants a few inches long and very delicate. No. 22739, Hermosillo, Sonora, October 27, 1926, in open places on slopes.

Diospyros Californica Brandegee. Guayparin. Shrubs not over 20 feet high, in clumps. Trunks white or gray, a foot wide, nearly erect, branched above. Twigs stout. Leaves evergreen, oblong-obovate and acute, rough, shiny above. Fruit about an inch wide, truncate above and so oblately spherical, green, smooth, at maturity a chocolate-black and quite soft. Tastes sweet and is good to eat. Seeds about 8 and about 1 cm. long and hardly half as wide, yellowish. It grows on the edges of sandy washes on the plains, or on gravelly slopes in the mountains. On the plains it grows with Parkinsonia, and the like. It has the bark of an oak and is a rigid shrub. I found it on the plain west of La Paz 14 miles. Also at about 3,000 feet altitude on the Laguna mountains. The fruit has a rather sickish taste and a person would not naturally eat much of it.

Papaya Carica. At La Paz Mrs. Meyer had this growing in her garden. It had been planted a year and nine months, from the seed, and was 15 feet high, with a trunk 6 inches in diameter, and was copiously fruiting. It therefore is the most rapid grower, except the bamboo. I also saw it growing at Miraflores and at Todos Santos. I had previously seen a tall tree of it at the El Tigre mine east of Acaponeta, and ate the fruit there.

There are two species of bamboo grown in western Mexico that I saw, vulgaris and aculeata. Both grow at San Jose del Cabo. There is a clump there of aculeata that is 75 feet high and covers a quarter of an acre. The poles are sometimes 6 inches thick.

Yucca australis. This is the plant that Goldman calls Y. valida in his report. It is occasional in the brush everywhere, but west of La Paz 14 miles it forms forests. The general aspect of the plant is bluish, and in the brush is 2-10 feet high, but out on the plain becomes 30 feet high. It is loosely stoloniferous and with slender stems nearly erect. Leaves are 1½ feet long, somewhat ascending, glaucous-bluish above and dark-green below, nearer apple-green, long-acuminate above, a little contracted below, thin, very concave, not over 2 inches wide, very many, and with bases closeset, not with threads on the sides. The uppermost 1-4 feet of the top of the trunk is covered with these leaves which in age become reflexed and which sheath the stem almost to the very base. The trunks are never more than 4 inches thick. Panicles a foot and a half long, sesile, with widely spreading branches. Fruit apparently pendent, very sweet and with pulp ¼ inch thick. Seeds thick, rugose, black. No flowers seen. Got near Todos Santos, January 31, 1928. Prefers sandy soil, not in washes. On the big mesa west of La Paz are forests of it. There the leaves are from half a foot to 2 feet long and with fine threads. The trunks are always slender and never big as in Y. brevifolia.

Yucca australis var. valida (Brandegee). Yucca valida Brandegee. This plant is manifestly not an ally with Y. brevifolia (arborescens), but is a very arid form of the common australis which is markedly different from brevifolia in the flabby leaves and slender trunk.

Washingtonia filifera var. Sonorae. W. Sonorae Watson. The attempt to keep up this species by Parish and Standley on the petiole character is abortive. The tip of the petiole is never "obtuse." It is always acuminate from a deltoid base, varying much. The more obtuse forms are young plants. For the most part the trees in Mexico are not allowed to have the leaves from the thatch that they would do normally because they cut them off for thatching houses. This thatch is about that of the var. robusta, but the trunks are those of normal filifera. The threads are very variable. The first flowers come out in a sheathed cone with tapering tip, longer than the leaves. The trunk is rarely a foot thick in the tall trees, the trees get as high as the cocoanuts, and are mostly covered their entire length with the dead petioles, but there are a few trees that are self-pruning. The leaf blades are about 3 feet long, barerly or fully as long as the fully armed petioles which are deltoid to linear-triangular at the tip. The segments are broadly linear-acuminate, and the outer half of the segment is pendent and vibrating in the wind, and often whipped to threads in age. The trunk never stolons, and will average a foot in diameter. It grows in sweet soil (not alkaline), where it is quite wet, the same kind of soil as the dates and cocanuts grow in. It begins to bloom in March. At La Paz the roots go down to the tidewater.

Sida ampla N. Sp. Slender and erect shrub or herb 4-6 feet high with paniculate inflorescence many flowered. Leaves cordate-ovate-acuminate, 1-3 inches long, rather thick and densely and minutely and velvety-pubescent with stellate hairs becoming yellowish, palmately 5-7 nerved, on

slender petioles half as long, rather doubly low-serrate, much lighter-colored below, rather scanty. Panicle leafy throughout the main branches, which are mostly racemosely compound and with smaller leaf-like bracts. Flowers nearly sessile, the calyx globose-ovate, about 5 mm. long, densely hoary as are the leaves, and with appressed lobes ovate and acute and with raised margins and midnerve making the calyx very strongly 10-angled since the lateral nerves run down into strong angles in the sinuses. Petals apparently yellowish but not developing or vespertine. Carpels half as long as calyx, about 3 mm. long by 2 mm. wide, half-reniform, triquetrous in cross-section, rather flat on the back, and shortly hairy and rugose. The empty tip thin but not produced much. The single seed triquetrous, chestnut-colored, smooth and hard. No 22858, Acaponeta, Nayarit, February 25, 1927, and El Tigre mine, March 1. This appears near to S. cordifolia L. but sufficiently distinct.

Kosteletzkia bracteosa N. Sp. Slender shrub, 6-8 feet high and widely branched. Leaves thin, 1-2 inches long, triangular-ovate, acuminate, sharply serrate, truncate to cunate below, not lobed, sparsely stellate-hairy below, on a petiole about 1 cm. long. Flowers single in the axils of the upper leaves, on long peduncles about twice as long as the leaves. Bracts about 8, linear, nearly an inch long, green, ascending, equaling the petals, which are dark-purple, and which surpass the stamens. Fruit globose, hispid above, with single long-hairy seeds. San Blas, Sinaloa, February 1, 1927. No. 22863.

Lopezia globosa N. Sp. Slender and erect annuals, widely and openly paniculate and with very slender stems rscemosely and scatteringly flowered above with a single flower in the axil of each leaf. Leaves elliptical to ovate, inclined to be erose on the margin and when young sparsely strigose-hairy, as are the younger parts, thin, 1-2 cm. long, acutish, on petioles 2-3 mm. long. Pedicels capillary, widely spreading, about 2 cm. long. Flowers in bud about 5 mm. long and broadly linear, dark-purple and smooth, with ovary globose and constricted at very tip. Calyx split nearly to the base, and with the 4 lobes equal and widely spreading in anthesis, falling entire at maturity. Abortive stamen appearing stiff, white below and pink above, half-obovate-arcurate, on a short stalk and often with a green spot on the inner upper corner, about 2 mm. long. Petals 4, one of them longer and rather oval in outline, crumpled or erose on the margin, white, on a long stalk, the other three petals purplish, with much the same shape but laciniate. Anther on the perfect stamen linear-arcuate and acute. Petals nearly twice as long as the sepals. Pods globose, about 3 mm. long, splitting at tip into 4 recurving segments. This species appears nearest to Rose's Pelozia laciniata but differs in the Semeneiandroid capsule. Tepic, Nayarit, February 9, 1927. No. 23299.

Lopezia laciniata (Rose). Pelozia laciniata Rose Cont. Nat. Herb. 12 296.

As to Rose's Pseudolopezia I am not prepared to say, but I think

too much stress is laid by him on deviations from typical Lopezia, and that the deviations are only specific and not generic.

Linum gracilentum N. Sp. Very weak and slender annual, ascending to erect from a decumbent base mostly. Branched below. Stems rounded, but with a few vertical lines or striae. Internodes 2-3 times as long as the leaves. Leaves about 1 cm. long, thin and flat, acute, oval-ovate, in fours, 1-nerved. Whole plant smooth except the upper stems and pedicels, which are hairy, margins of upper leaves, bracts and sepals cilate with very short and gland-tipped hairs, but no evidence of glandular substance exuded. Stems terminating in small and copiously flowered corymbs a few inches long and wide, with capillary branches. Pedicels and subulate bracts about 3 mm. long, and as long as the acuminate-triangular calyx lobes, which are incurved over the depressed-globose capsules. Lobes hyaline but with three green nerves. Flowers lemon-yellow, and about 4 mm. long. Stamens elongated. This plant belongs to the Greggii group, but seems to be undescribed. No. 22882, Tepic, Nayarit, February 15, 1927, growing in open slopes.

Dendromecon Piercei N. Sp. Shrubby-based perennial, mostly biennial, with ascending stems 2 feet high and tufted and little branched, ending in few flowers on erect peduncles. Flower buds spherical and about half an inch wide and like the rest of the plant glaucous. Sepals 2-3, round, imbricated, tardily deciduous, reflexed in anthesis and very concave. Petals like those of Eschscholtzia Californica but of uniform lemon-yellow color throughout, about 1.5 inch wide. Stamens about 50, and half as many as in Romneya and twice as many as in Eschscholtzia. Ovary ending in a contraction or very short style which is terminated by a peltate stigma which is concave above and inclined to be rectangular or 2-lobed, and white, much as in Dendromecon rigidum but not so conspicuously 2-lobed. Leaves those of Eschscholtzia Californica but lobes very narrowly linear. Fruit a 10-striate linear capsule like Dendromecon. This plant Mr. Pierce informs me was got originally in a package of seeds sent him as Eschscholtzia Mexicana. It has been growing in his garden for over five years and reseeds itself regularly, and breeds true. It therefore cannot be a hybrid. The leaves are wholly unlike Dendromecon, and the habit is that of an Eschscholitzia, but the stigma and sepals are very different. The sepals of Eschscholtzia are calyptrate, that is united at tip and pulling off as the flower opens. The stigmas are linear-subulate and in the larger flowers a cm. long, and erect. The stigma of Dendromecon is flat and 2-lobed and rather stipitate. The stigma of Romneya is that of Argemone and Papaver that is radiate, sessile and of 10 parts flat on the tip of the capsule.

Tournefortia Tepicana N. Sp. Shrub 6-10 feet high, with slender branches and copious leaves. Stems spreading-strigose. Leaves about 1 dm. long by 4 cm. wide, elliptical, shortly acuminate, rounded to truncate at base, entire, ashy with appressed white hairs which are brownish and more prominent on the nerves. Petioles stout and 1 cm. long. Inflor-

escence terminal, pyramidal, compound, of many clustered and short and scorpioid racemes seldom an inch long. Flowers white, about 5 mm. long, slightly funnel form, the hairy tube 4 times as long as the very broad lobes, and 2-3 times as long as the calyx whose lobes are linear and longer than the tube. Whole flower short-strigose with yellowish and appressed hairs. No. 23134, Acaponeta, Nayarit, February 26, 1927, growing on slopes and hills.

Evolvulus ramulosus N. Sp. Apparently an annual or short-lived perennial, ramulosely branching and straggling over the ground, with innumerable and rather capillary branches with short internodes. Leaves oval to oval-ovate, 1-2 cm. long, on a stout petiole about 3 mm. long, softly and finely appressed-silky-pubescent with long and white hairs, as is the whole plant, including the corolla. Pedicels 4-6 mm. long and reflexed and capillary. Sepals ovate and acute, about 2 mm. long and as long as the widely open and blue corolla. Pods depressed globose, a little longer than the sepals. Seeds globose-ovate, green, smooth. No. 23135, Tepic, Nayarit, February 12, 1927. Growing in open places.

Ipomoea equitans N. Sp. A closely twining and perfectly smooth vine, with long internodes. Leaves very deeply cordate-ovate and shortly acuminate, 1-2 inches long by an inch wide, entire, with the sinus completely closed and edges overlap and equitant on the elongated peduncle which is nearly 1 dm. long. Petiole very stout and 2-4 mm. long, occasionally with a few long hairs. Flowers in a twin cyme and then appearing as if on a one-sided raceme on eachbranch, with minute bracts. Pedicels 1-2 cm. long, capillary and enlarged a little upward. Flowers an inch long, orange, funnelform, about half an inch wide above and gradually enlarged upward. Calyx split to the base, with trangular lobes nearly linear and 3 mm. long and green, spreading in fruit, smooth. Fruit oval, 5 mm. long, smooth, apiculate. Seeds nearly oval, 3 mm. long, mottled, finely pubescent. Tigre mine near Acaponeta Nayarit, March 1, 1927. This would appear to be near I. Wrightii.

Buttneria trilobata N. Sp. Slender and erect shrubs about a yard high, with chestnut-colored stems racemosely branched above. Outline of leaves ovate to deltoid-triangular and 3-lobed, would be hastate if the lobes were sharp but they are rounded, about 4 cm. long by 2-3 cm. wide, shortly acuminate, nearly equally crenate throughout, green, smooth but minutely papillose above, lighter below and very sparsely stellate-pubescent. Leaves reduced above. Flowers yellow, about 6 mm. long, in small umbels in the axils and without peduncle to the umbel. Fruits reflexed on slender pedicles not 1 cm long, nearly globose, sparsely prickly above the middle and prickles about 2 mm. long, fruit 4 mm. long, minutely roughened. No. 22538, Mazatlan, Sinaloa, November 20, 1926.

While botanizing in Mexico my attention was attracted to certain Onagraceae, such as Lopezia, and Semeiandra, in the specializing of parts. This was again recalled in studying various Godetias in cultivation last year. Now I find the same tendency in Clarkia elegans, and I do not discover any reference to these facts in any publications. The peculiari-

ties show a much closer relation to the Leguminosae than is commonly supposed. In the flowers of Clarkia elegans there is distinct asymmetry in the arrangement of the petals as though they had been derived from the papilionaceous corolla. The two upper petals seem to represent the wings of the pea flower, and the two lower ones the parts of the keel, the banner being absent. Then the stamens are declined below and ascending at tip as is the style. Then they are in two sets. The inner set of four is shorter by an anther's length than the outer, and the anthers are about 3 mm. long and white, while the outer ones are 4 mm. long and red. The similarity does not extend to the pods.

Hedeoma gracillima N. Sp. Apparently perennial from creeping rootstocks with stems mostly simple above the branching base and very slender and a foot long and weakly erect. Whole plant glabrous except the petioles are mostly retrorsely short-hairy, and the leaves and calyces have scattered rudiments of hairs. The mouth of the calyx within has a ring of white hairs. Leaves very thin, without evident resin dots, rhombic-ovate, acutish at tip and cuneate at base, entire or with few scattered and very low cerenatures, the blade 1.5 cm. long, with capillary petioles about as long as blade, and longer than the capillary pedicels. Leaves but slightly reduced above. Stems floriferous on the upper half or two-thirds. Flowers mostly two to a node, the pedicels reflexed and then abruptly arched upward and about 1 cm. long. Calyx 3 mm. long, triangular-cuneate and not swollen in the middle nor conspicuously closed at throat, the 5 ovate teeth about the same length and strongly 3-nerved and about 1 mm. long. Corolla tube not exserted, the lobes broad and reflexed, purple. Stamens 4, a little exserted, the anther cells divaricate to about 90 degrees and elliptical and attached by a broad connective. The lower stems are filiform and root at the nodes. No. 22849, San Blas, Sinaloa, January 28, 1927, growing on bottom lands along with Salvia lanceolata and other weeds.

Russellia. This genus as to Standley's Shrubs and Trees of Mexico is badly mixed. The character of 4-6 angles is found on the same plant, the young stems 4-angled and the older and larger ones 6-angled. Some plants, in fact all the plants I have seen, are pubescent between the ribs such as polyedra, Jaliscensis, Deamii, sarmentosa. Most of the species have ternate leaves at least in part. Standley fails to state that all the angles are raised into conspicuous rounded ribs, and the ribs are warty roughened when pubescent. His key is worthless in determining the species, and there seem to be at least twice as many species recognized as exist.

Pedicularis Tepicana N. Sp. Slender and erect herbs 2-3 feet high, branching above, and branches terminating in short spikes 2-3 inches long. Leaves narrow, the middle ones at least 1 dm. long, completely bipinnate, and segments cuneate-oblsnceolate and rarely 1 cm. long, the terminal ones twice as long as the lateral ones, all sharply apiculate with a callus tip, and scabrous. Calyx in fruit with tube 3 mm. long and equaling the subulate-triangular lobes which are ciliate on the margins. Corolla about

2 inches long, linear, too old, red. Pods twice as long as the calyx tube, oblong-ovate and abruptly acuminate. Seeds many, white, not ½ mm. long, oblong, with cellular coat raised about ¼ the diameter in a conspicuous honeycomb, the cells forming one to four rows. No. 23211, Tepic, Nayarit, February 15, 1927, on slopes along with Semeiandra.

Anisacanthus glaberrimus N. Sp. Plants wholly glabrous, and green except the young bracts and adjacent stems. Shrubs 3-5 feet high, with slender branches. Leaves elliptical, shortly acuminate at both ends, on a very short petiole a few mm. long, entire. Flowers in terminal and short or compound racemes, red, 2-3 cm. long, many. Bracts about as long as the calyx (2-3 mm. long), very shortly and deciduously pubescent, triangular. Calyx lobes linear. Corolla linear to the middle and 2 mm. wide, then quickly enlarging to 5 mm. wide. The lower lobes broadly linear and spreading, and nearly as long as the ampliate portion, the other erect. Pods about 2 cm. long, including the stipe, which is as long as the body, which is oblong and shortly acute at both ends. Seeds 2, circular and flat, 3 mm. wide. Anther cells linear and opposite. No. 22976, Acaponeta, Nayarit, at the El Tigre mine, March 1, 1927. This is the type, and has head-like racemes at the ends of the twigs and about 2 inches long, and single. I also refer here No. 23266 from the same locality, but with many short racemes in a compound cluster often 6 inches long.

Ixtlania acicularis N. Sp. and N. Gen. of Acanthaceae. Ascending perennials rooting at the nodes, a foot or two high, stems inclined to be bent at the nodes, sparingly branched, variably canescent with somewhat reflexed hairs which are jointed and flattened, and apparently with some minute glands intermixed, becoming smoothish. Leaves ¾ inches long by an inch wide, flat, leathery, shining above, lighter below and seemingly scabrous but really smooth though roughened by the raised cystoliths and nerves, elliptical, shortly acuminate, truncate to rounded at base, on a stout petiole 4-6 mm. long, entire. Flowers in clusters of 3-5, very dense spikes in each of the upper axils, much as in Beloperone Hassleri but hoary. Spikes about 1.5 cm. long, narrow, erect, of few flowers. Bracts linear-lanceolate and subulate-acuminate and acerose-tipped, hardly distinguishable from the subulate, hyaline-margined, acerose, plumose, calyx lobes, all about 1 cm. long and appressed. Corolla cylindrical, 8 mm. long, not ampliate above, the upper lip very short and erect, the lower of 3 almost round divisions 2-3 mm. wide, pink-purple, yellowish at the throat. Stamens just exserted, 2, each of a single anther cell with a conspicuous white ear at the base and oblong, then obliquely enlarged to a rather wide blade above as long as the proper anther cell which is twisted and rounded at tip. Filaments rather broad. The anthers resemble those of Nelsonia Anisostachya, but are conspicuously di...erent in detail. When I collected it I imagined it might be an Elytraria. The cystoliths place it definitely in the Acanthatceae. No. 23534, Ixtlan, Nayarit, February 19, 1927, growing in fields. Fruit not seen.

Monardella Lagunensis N. Sp. Rather dense shrub 2 feet high, racemosely branched above, each branch terminating in a single large head

about an inch wide. Leaves about 2 cm. long, by 1 cm. wide, elliptical-ovate, entire, obtuse, pubescent with short hairs on the nerves, acuminate into petioles about 4 mm. long. Stems and petioles short-pubescent with white and spreading hairs. Heads appearing smoothish, with elliptical and greenish bracts rounded on the outer ones and acuminate in the inner ones and inclined to be somewhat colored, closely appressed, hairy above on the nerves and feather-veined, inconspicuous. Calyx 1 cm. long, contracted at both ends and smooth below, sparsely pubescent above. Teeth about 1 mm. long, triangular and colored. Corolla white or only tinged with purple, the tube exserted a trifle beyond the calyx tips, then split into very narrowly linear lobes about 1 cm. long, which spread at right angles and are crumpled in the dried speciments, about as long as the filaments. Anthers 4. No. 24180, Laguna mountains, March 2, 1928. Growing on rocks on the mountain sides at 3,500 feet altitude.

Sphacele hastata Gray. This magnificent mint, with its bright red-purple flowers and glutinous inflorescence, is very conspicuous in wet places along rivulets in the Laguna mountains at 3,000 feet altitude. The leaves are from truncate-hastate to obcordate at base. The lobes of the flower are from two to three times as wide as long and very much rounded, to almost oblong. The floral bracts are cordate and leaf-like but short. The calyx lobes are subulate from a broad base, and the 3 upper ones are mostly twice as long as the other two,and calyx split deeper at the pseudo lobes. Brandegee reportsit from the San Francisquito mountains. The calyx enlarges somewhat with age and becomes 10-ribbed and with cross lines between the ribs, forming meshes. The seeds are flattish and shining black. I do not see any glandular disk below the seeds. There is a very considerable variation in the plants.

Lobelia regalis Fernald. Stout plants 2-3 feet high, much as in L. Tupa L., erect and mostly simple, floriferous in the upper axils, softly and minutely ashy-pubescent throughout even to the corolla and stamen tube. Leaves oblong-lanceolate, often 1 dm. long, acuminate, cuneate into a short and margined petiole, callus-serrulate on the margins by minute teeth about as long as the hairs, 2-4 cm. wide, gradually reduced above. Flowers solitary in the axils, on slender peduncles about 2 inches long. Calyx depressed-hemispehrical, about 8 mm. wide and 4 mm. high, with triangular teeth about as long as tube. Corolla fiery red, 3-4 cm. long by 5 cm. wide, split to the middle with all the lobes linear but the upper one, which is oblong. Anther tube 5-7 mm. long by 2 mm. wide, white, arched, with a tuft of stiff bristles on the end. Seeds minute, elliptical, with a very thin wing. No. 23197, Ixtlan, Nayarit, February 19, 1927. I also refer to this No. 23191, Tepic, February 10, 1927. This species at once suggests Lobelia Tupa L. but the leaves are not sessile, the anthers are white and not black and longer. This may be L. regalis Fernald, a poorly described species, at least it is near it.

Lobelia Cotensis N. Sp. Allied to L. appendiculata. This is one of the frailest of the annuals, erect, a foot or two high, simple below, the stem produced into a seemingly naked peduncle a foot or two long and

strict, and terminating a one-sided raceme which is very lax and open. Generally shorter and capillary racemes arise from the uppermost one or two axils, having flower or two on them. Proper stems rarely 4 inches long and with half a dozen internodes shorter than the very thin leaves. Lowest leaves very small and rarely an inch long, reniform-ovate to ovate and acuminate and finely toothed. Middle leaves the widest, 1-2 inches long, cordate-ovate to almost round, sharply lacinate-dentate to shallow-crenate on the same plant, all on capillary petioles nearly as long as blade, or longer in the lower leaves. Uppermost leaves inclined to be lanceolate-acuminate and 2 inches long, and cuneate below and sharply laciniate toothed, the petiole short. Leaves not reduced upward but terminating abruptly at base of peduncle. Bracts linear, green, inconspicuous. Pedicels capillary, 1 cm. to 2 inches long, inclined to be hooked at the top. Flowers sky-blue, delicate, about 1 cm. long. The lower lobe very broadly fan-shaped and 3-lobed, 5 mm. long by 8 mm. wide. Upper lobes 2, spatulate, ¾ mm. long, spreading. Corolla tube surpassing the calyx lobes by 3-4 mm., mostly white, produced below into a conspicuous spur, 1-2 mm. long, which is encased in the distorted base of the calyx, which is really the other half of the calyx thrown back into a knob and then produced again into 2 green and subulate-lienar lobes (2 mm. long) standing at right angles to the calyx tube, the whole reminding one of a serpent's jaw widely distended. The anthers just reach the end of the corolla tube, are blue, and with the usual tuft of white bristles at the end and 2 mm. long. Capsule not seen. No. 24147, Cota ranch, 14 miles east of Todos Santos, at the base of the Laguna mountains, February 21, 1928, growing in the shade of trees along with Lyocarpa Xanti, and other annuals in loose soil. I also refer here No. 24365 from the eastern side of the Laguna mountains, March 2, 1928, and No. 24366, San Bartolo, February 27, 1928. The plant is quite common, but evanescent. The Laguna mountain specimens have the lower lobe of the corolla split to the base into three broadly obovate lobes. The upper calyx lobes are about as long as the lower.

Galium nitens N. Sp. Allied to Rothrockii. Shrubbery at base and intricately branched with very slender stem a foot or two long, smooth and shining throughout except the fruit. Leaves in fours, about 1 cm. long, strongly 3-nerved and with sides revolute, linear but a little wider above, acerose-apiculate, a half to a third as long as the internodes. Flowers apparently single in the upper axils. Divisions of the fruti about spherical, 1-2 mm. long, roughened all over by minute triangular and sharp processes like rudimentary hairs. Nogales, Arizona, October 23, 1926. No. 22352.

Houstonia asperifolia No. 24010 Flowers pink-purple. Corolla lobes 4, broadly spreading, ovate, longer than the 4-angled tube. Stigmas 2, exserted or inserted. Stamens 4, one form on the throat of corolla, the other form half way down on the tube and connivent at tip, linear, straight, when discharged filiform and blue-purple. At the insertion of the stamens are black-linear lines or stripes 1 mm. long between the

insertions. Plants growing in desert places where it is very dry. other respects.

Verbesina grandis N. Sp. Tall plants 6-8 feet high, coarse and widely branched and with very large leaves, 1-2 cm. long, with deltoid to ovate outline, and inclined to be hastate-lobes in the middle and with erose margins, thin, minutely and densely roughened by yellowish hairs all over, acuminate, rounded below into a very broadly winged petiole an inch long, which wing is decurrent on the stems. Stems nearly smooth, striate, thick and hollow and winged throughout to the tip of the inflorescence. Inflorescence completely corymbose and of very many heads about 5 mm. long. Scales imbricated in 2-3 series, the outer green and oblong-ovate to triangular and acute and ciliate and nerved and appressed, the inner thinner and more hyalina and oblong-lanceolate, and puberulent, disk-scales linear and puberulent above. Rays oblanceolate about 5 mm. long, yellow. Stamen-tube black, and white at tip, exserted. Akenes 2-3 mm. long, the body linear and flat, inclined to be black and smooth. Wings a little corky next the seed then thinning out to a paer edge and lacerate above, wider than the body, white, produced above and decurrent into the slender awns, and making the whole seem deeply obcordate. When over-ripe the heads appear squarrose and with conspicuous awns. No. 23420 Tepic, February 14, 1927, and No. 23421 Acaponeta, Nayarit, February 26, 1927. This species seems near to V. alatus.

Perezia foliosa N. Sp. Plants very leafy, with short internodes and leaves overlapping and appressed. Plants appearing smooth throughout, but lower side of leaves lighter colored, minutely scabrid with rudimentary hairs, which on the veins are longer. Veins and veinlets raised on both sides of the leaves. Leaves about 1-1.5 cm. long and 2-3 cm. wide, somewhat leathery, linear-lanceloate to oblong-lanceolate and acuminate, inclined to be narrowed below and eared at the sessile base, closely and spinulosely short-toothed with rounded sinuses, and with a continuous raised margin all around. Heads 2-3 in the uppermost axils of somewhat reduced leaves, a little over 2 cm. long and obconic, and a little wider than long and purple-tipped, as are the flowers. Bracts lanceolate-acuminate and acerose-tipped, papery, very many, smooth, appressed. Flowers barely surpassing the bracts, purple, one lobe about twice as long as the others. Pappus scanty and of very long and capillary hairs almost as long as the flowers. Akenes black, linear, covered with raised glands. No. 23358, La Barranca Nayarit, Februry 21, 1927, on prairies. Stems tufted and herbaceous, and about 2 feet high and erect.

Mexianthus Robinson. I saw the type of this genus at Berkeley in June, before the genus was published. To all ppearances it was the same as my number 23419, got at Acaponeta Nayarit in 1927, a cursory examination. But on studying it microscopically I find my material is Eupatorium monanthum with the characteristic pappus of that genus, and the long and club-shaped stigmas. tI is rather curious that two genera should be so much alike and growing so near to each other. They remind one of Coulterella in the single-flowered habit, though not at all alike in

other respects.

Franseria. At Miraflores this is the most common Composite. It grows about 10 feet high, with acuminate leaves 6 inches long. It is a bad hay fever plant and abounds from the Cape north on both sides. It gave me a bad cold.

Franseria Bryanti Brandegee. This rather densely branched shrub is about 2 feet high, shrubby below. Was in full bloom January 31, 1928, at Todos Santos. It produced an enormous amount of pollen with a very strong odor that readily caused hay fever reactions.

Viguieria deltoides Gray. Shrubs allied to E. albescens; 8-10 feet high, tufted at base, with slender stems branching widely and gray-barked, forming an open and rounded outline, decidedly taller than the usual Encelia, with black center. Upper side of leaves shining and green, appearing as if smooth but really very rough with very short and stiff white hairs from a pustulate base but the hairs sparsely scattered, with veinlets rather impressed. The lower side of leaves lighter colored, and with rather more hairs somewhat longer and becoming hispid on the veins and nerves, but still very short, with veins and veinlets raised into sharp ridges. Leaves rhomboidal-ovate, obtuse, entire and with slightly revolute margins, 2-3 inches long by 1.5-2 inches wide, leathery, deltoid-cuneate below into a stout petiole about 4 mm. long, opposite, 3-nerved from the base. Internodes 2-4 times as long as the leaves. Inflorescence terminal, rather corymbiform (but really racemose), with single heads in the axils of reduced leaves below and on long peduncles, and the upper heads on shorter peduncles which are subtended by mere bracts. Heads with yellow disk flowers, and disk rather hemispherical. Heads 5-10 mm. wide and long. The ashy bracts linear, acutish, not over 1 cm. long, the outer ones rather spreading, all ashy but smoother at tip, and rough with minute hairs as are the nodes and petioles. Inner bracts subtending the akenes, linear, hyaline, greenish, waterlined and rather many nerved, a little lacerate at tip and pubescent there, longer than the involucral bracts. Rays oblanceloate, entire, yellow, about an inch long and widely spreading. Pappus of the ray a crown of lacerate-tipped scales about ½ mm. long and without awns. Pappus of disk flowers of two strong palaeaceous awns which are hispiduloua and about 4 times as long as the crown of scales (the same as in the ray). Akenes flat, silky-hairy all over, black. This species and the other Encelias are the chief source of sticks for the panoche crates of the Mexicans. The wood is hard and strong. This is No. 24126 from Todos Santos. It grows on the slopes of the hill southwest of Todos Santos, and is rare. The induration of the base of the scales is a myth. I think the separation of Vieguieria from Encelia is altogether too artificial.

Zexmenia epapposa N. Sp. Plants with the habit of Heliomeris multiflora, slender, about 2 feet high and sparingly branched throughout, rough-hipid with appressed white hairs. Leaves closely and finely serrate, acuminate-lanceolate from a triangular base, and nearly sessile,

about 2 inches long, opposite, thick. Heads terminal on filiform peduncles 2-4 inches long, generally with 1-3 short and leaflike bracts,, then with a series of oblong and rather scarious bracts with greenish tips, then others more scarious and incllined to be lacerate at tip. Outer akenes inclined to be flattish and with two wings, the other two angles acute but not winged, the face very warty. Inner akenes 4-winged and 4-angled and less warty, all about 3 mm. long and elliptical-obovate, without pappus. Rays yellow, oval, 2-3 mm. longer than the bracts, heads about half an inch high and hemispherical. No. 23394 Acaponeta Nayrit, near the El Tigre mine, March 1, 1927.

Cacalia Tepicana N. Sp. No. 23357. Tepic Nayarit, February 10, 1927. Strict herbs 4-6 feet high, erect and simple stemmed, leafy, purple stemmed and angulate as are the petioles, deciduously somewhat pubescent on younger parts, but leaves smooth and shining but lighter colored below, veiny. General outline of leaves is nearly round and 3-4 inches long, shallowly angulate-dentate with 6-8 teeth which are much wider than high, and with few rudimentary teeth on the margins. Midrib of leaves dissipates quickly into 4-5 pairs of stout veins near its base, and these veins branch on the outer side into one or two others, and sinking into veinlets at the tip. The tip of the stems dissipates into small and long-peduncled panicles in the axils of the upper leaves, which are somewhat reduced, the whole plant ending in a rather large panicle. Heads about 5 mm. long, of about a dozen flowers, with very white pappus, the scales at length widely spreading, linear and obtusish. Growing on gravelly and prairie-like slopes.

Melampodium hispidum H. B. K. This is seemingly closely related to Hemiszonella Durandi, but plants without glands or glutinous pubescence. Leaves and bracts ciliate with stiff and white hairs, and surface of leaves with scattered hairs. Bracts thin and oval, about 3 mm. long, barely as long as the akenes, which are obliquely oblong-obovate, much flattened, truncate in cross-section on the back and without warts, with sides with scattered and sharp warts but no glands. Tip depressed-truncate. Corollas yellow, much recurved and setose-hairy below, less than 1 mm. long, pappus none. Otherwise as in H. Durandi. Plants 6-12 inches high, erect, growing in waste places. Nogales, Arizona, October 23, 1926, No. 22681.

It is evident to me that Hemizonella of Gray is a part of the genus Melampolium.

Melampodium Durandi is Hemizonella Durandi Gray.

Melampodium minimum is Hemizonella minima Gray.

Both the above species are closely allied to Melampodium hispidum H. B. K.

Shrubs and Trees of Mexico by Standley. This is a voluminous annotated list of Mexican aboreous plants, but cannot be called a shrub and tree flora for the descriptions are inadequate. It shows great haste in compilation, and a very cursory study of the species given, and yet is very helpful in many ways. When we come to a thorough examination

of the genera we find the work quite unsatisfactory. For example: Schrankia, a genus with over half a dozen Mexican species, is not given at all. When we come to the palms we find Standley knows nothing about Washingtonia or Erythea, just follows published species, but shows no study of either genus, or has any conception of the real generic characters if there are any. But he recognizes all the published species as good, when in fact probably not half of them are any good. The same treatment is accorded the persimmons species. From his book no one knows whether there is one species or nearly half a dozen. As to geographical distribution he is all at sea, showing very little knowledge of the distribution of plants in Mexico. The fact that most of Mexico is in the Tropical life zone, and that distribution is more a matter of humidity and accident, adds to the confusion.

ADDITIONAL U. S. NOTES.

Iva Nevadensis Jones. Dr. Asa Gray, in the Synoptical Flora 247 says of this, "but Akenes not 'finely striate.'" Anyone who has ever put the akenes of this species under the microscope knows that they are finely striate, Gray to the contrary notwithstanding, and there was no occasion for this outburst just because I dared to publish my own species in my own way. Gray was first, last and all the time a gentleman, except in such cases as this when we printed our species without consulting him, and then he was a boor. His attack on Buckley for coining new names for Nuttallian species, though justified, was a case in point, and he did not hesitate to misstate things then.

Berberis Fremontii Torr. In the Botany of the Mexican Boundary, page 30, Torrey gives the type locality as western Texas and New Mexico, and in his description he gives the berries as blue. What should have been his type is the material got by Fremont on the Virgin river, western Utah, and adjacent Arizona and Nevada, and this material never has blue berries. They are light-yellow, normally decidedly inflated, and rarely red. Occasionally they are full of pulp and then red and make fine preserves, but for the most part are punctured by an insect and bladdery. I have seen millions of specimens of it and never yet saw a solid berry. It is certain that in his description Torrey confused B. Wilcoxii with his type.

Crossosoma Bigelovii Watson. The type of this species was got on the Bill Williams river, which is the first draw south of the Chimhuevis mountains, Arizona. I got material of the species in the latter place in full flower. My material would correspond well with Robinson and Fernald's C. parviflora, for the flowers are quite small. Material got by myself and others in the Catalina mountains, Arizona, have flowers twice as large, and the twigs well developed and making the leaves scattered and not fascicled. The petals in this form are cuneate-oblanceolate. In the form referred to here from Whitewater, California, the flowers are the same size as the Catalina form, and petals oblong-oblanceolate, and half

an inch long, white at first and becoming purplish toward the tip on the outside, widely spreading and evanescent. They seem to be mostly 5. The foloicles so far seem 2, or rarely 3. The stamens about 20. In all the forms of this species the leaves are about half an inch long and elliptical, and soft and spongy and very smooth, and entire and acute or acutish, they have a tendency to be a little enlarged above or below, enough so as to be called oblanceolate or lanceolate at times, but the normal form is elliptical. There is a peculiar feel of the leaves that is also noticeable in Paeonia, which is evidently a related genus. The stamens seem to vary somewhat but never less than 15, nor over 30. This year the species is in full bloom, February 24, 1929, at Whitewater, California, which is somewhat below 1,000 feet altitude. The ecological locality is friable and very recent volcanic flows, of about the consistency of Cretaceous sediments, on slopes along with Juniperus Californica, Eriogonum fasciculatum, Eriocoma cuspidata, Nemophila and Phacelia, and Echinocactus acanthodes. The stems are almost black toward the tip, rigid, short-branched above, subspinose, tortuous, tufted, 2-3 feet high and scraggly. The flower buds are depressed-globose, and 5-angled, and cuneate at very base. The disk is flat, fleshy or leathery, and 6 mm. wide, and on it arise unevenly the 15-25 stamens, whose filaments are round and capillary and about 4 mm. long and erect. The broadly linear yellow anthers all attached about two-thirds the way down to the filaments, and the cells are divaricate mostly at the base almost to the middle, they split from the bottom upward but not to the tip. The stigmas are depressed-capitate and almost sessile and with a furrow parallel to the septum. The follicles are sometimes 3. Flowers fully an inch wide to an inch and a half. The petals are attached to the disk just inside the angle of the calyx lobes. Calyx lobes round, much cupped, greenish-white, very obtuse, very closely reflexed in anthesis, about 4 mm. long. The petals are very thin and entire and rounded at tip. The leaves of the Whitewater form in flower are closely fascicled, the outer ones obovate, the inner ones oblanceolate, frequently the outer ones are retuse. The whole plant is perfectly smooth. The pedicles are about half an inch long, and single. I think Robinson is right in referring C. parviflora to Bigelovii, for the species is decidedly variable. I think this is the first time that the flowers have ever been studied fresh.

NOTES ON CARYOPHYLLACEAE

Arenaria quadrivalvis R. Br. seems the same as A. verna.

Arenaria obtusiloba Rydberg is A. Sajanensis.

Arenaria aequicaulis Nelson is A. verna var. hirta, and seems the same as A. propinqua Rydberg.

Arenaria macrantha is Sajanensis.

Stellaria was published in 1753, L. 272. Alsine was proposed by Tournefort 126 but no species published. The same in L. Gen. No. 380. Then Alsine was displaced by Stellaria in L. Gen. No. 568. The first species referred to Alsine was media (L. 272). Kew Index states that Alsine media L. is not Stellaria media but Spergularia media and if that

be true then Alsine is not a synonym of Stallaria, but when we consult the Species Plantarum we find that Alsine media is described as having bifid petal, which refutes the Kew Index statement, and makes it a synonym of Stallaria. The only other species on which Alsine could stand is segetalis, which is a Spergularia. Now out of the 275 names recorded in Kew Index under Alsine only two of them, media and nemorum, could stand, all the others being referred to other genera or hynonyms. Alsine has almost universally been considered the same as Arenaria, but the two species on which it stands are Stellaria media and Spergularia segetalis. Strict priority requires the displacement of all the names of Stallaria for a single species of Alsine.

Drymaria. It is evident that those who have treated this genus hitherto know very little about it. I find that the shape and markings of the seeds are valuable as are the sepals and habit. Robinson in Syn. Fl. p. 253 under one star says "Cauline leaves rather broadly ovate." He should have added "or wider."

Silene multinervia Watson is like a pediceled form of Gallica, the seeds are the same, but ribs of Calyx are 15-20. It seems nearest to conoidea but the seeds are quite different, and calyx ribs more. To me it looks like a hybrid between Gallica and conoidea.

Silene concolor Greene is S. Pringlei Wat.

Silene simulans Greene is laciniata Cav.

NOTES ON RANUNCULACEAE

Ranunculus Austinae is very nearly typical glaberrimus, and so is ellipticus Greene.

Ranunculus Eschscholtzii. O. D. Allen's No. 97, distributed by Harvard as Suksdorfii, has sharp lobes but otherwise is Eschscholizii. No. 2669 Elmer from the Olympics is the same. It was distributed as Suksdorfii. Synonyms of this species are eximus Greene, alpeophilus Nelson, Helleri Rydberg, saxicola Rydberg, ocreatus Greene, Utahensis Rydberg.

Ranunculs vicinalis Greene is pedatifidus.

Ranunculus glaberrimus has as synonyms R. calthaeflorus Greene, inamoenus Greene and Populago Greene.

Ranunculus unguiculatus Greene is alismaefolius.

Ranunculus stenolobus Rydberg is adoneus.

Ranunculus arnoglossus is alismaefolius.

Ranunculus Earliae is occidentalis.

Aquilegia. This genus has been tampered with considerably lately, and without any attempt to grow the proposed species. There seem to be only two primary species in the genus in America, Canadensis and caerulea, and from these all the others seem to have arisen in very recent geological times, so recent that the species are not fixed. Theoretically one would not be inclined to think that flowers would divert to yellow, but actual study of growing plants shows this is the case. Another fact is that the yellow flowered forms prefer open sunlight more, and hot areas where there is abundant soil moisture. Red flowered forms occur in middle elevations, and blue flowered forms at high elevations. The use of

the term elevations is meant to cover not actual elevations as much as relative ones, that is, plants of the Lower Temperate life zone represent the lower elevations: Plants of the Middle Temperate life zone represent the middle elevations and plants of the Uppr Temperate life zone represent the high elevations. At the far south yellow flowered forms occur in the lower edge of the Middle Temperate life zone in the Sierra Madres of Chihuahua, such as A. Skinneri and chrysantha.

Aquilagia Laramiensis is flavescens, oreophila is caerulea, caulifax is formosa, elegantula is formosa, pallens is a form of caerulea, rubrocincta is formosa and so is triternata and lithophila. Tracyi is truncata, Wawensis is formosa and so are pauciflora and Columbiana. As I have stated previously Waston erred in stating what was his type of A. flavescens. His actual type was the high altitude form which is a hybrid between the actual A. flavescens and caerulea. What should have been his type was his No. 36, which he referred to his species as a high altitude form, and which I have taken as the type of my A. depauperata, which plant is not a high altitude form at all, but which he got in what is now called Pleasant Valley in City Creek canon, Salt Lake City, at an elevation of about 6,000 feet above the sea. He gives his elevations as 5,000 to 7,000 feet altitude, but was mistaken in saying that any Aquilegia grows at 5,000 feet altitude. I have gone all over the region with a barometer and know there is no such elevationwhere the plant grows. I think that about the only way to settle the name is to use it as a hybrid or to drop it altogether. On the contrary truly typical material is widespread in Idaho and corresponds well with his Wasatch form, which surely is a hybrid there, but the Idaho material cannot be a hybrid in Idaho. It is rather unique that Payson in his monograph reduces my depauperata and keeps up Laraminensis.

CORRECTIONS.

Page 159 Stallaria should be Stellaria.
158 foillcles should be follicles.
131, under Jussiaea clavata, add to last line " 22879, Tepic, Feb 11 1927.

INDEX.

Acacia 130
Acacia Mazatlana 141
Aeschynomene vigil 139
Aeschynomene glomerata 139
Agave 128
Agave aurea 128
Additional U. S. Notes 157
Abrams' Flora, Page 1
Allionia 124
Allium 54
Allium Inyonis 56
Alsine 62
Alsine 158
Anemia intermedia 123
Anisacanthus glaberrimus 151
Aquilegia 159
Aquilegia Laramiensis 160
Arenaria macrantha 158
Arenaria Sajinensis 158
Arabis juniperina 68
Antogonum leptopus 132
Arenaria quadrivalvis 158
Argythamnia bicolor 127
Astragalus 70
Astragalus bicristatus 70
Astragalus ervoides 133
Astragalus ervoides 69
Astragalus crotalarioides 69
Astragalus oocarpus 69
Bamboo 145
Berberis Fremontii 157
Botanical Notes (Mexican) 96
Botanists in Mexico 77
Brandegees 15
Braya graminea 68
Butteneria trilobata 149
Cacalia Tepicana 156
Caesalpinia Blasiana 141
Callitriche Mexicana 124
Cassia rotundifolia 139
Calochortus splendens X Plummerae 60
Cereus 130
Cereus Schottii 130
Cleome Sinaloensis 125
Cereus Pringlei 132
Cereus Thurberi 132.
Cleomella 38
Collinsia 36
Collinsia Brucae 124
Corrections to Synoptical Flora 28
Cosmos 71
Cracca lupinoides 137
Crassa axillaris 137
Cracca Blasiana 138
Cracca collina 137
Crossosoma Bigelovii 157
Crossosomataceae 68
Crassulaceae 29
Cruciferae 40
Cryptantha 18
Dalea Blasiana 138
Dalea maritima 130
Dendromecon Harfordii 63
Dendromecon Piercei 148
Desmodium luteo-canescens 127
Diplandra lopezioides 130
Diospyros Californica 145
Diphysa vesicaria 136
Dithyraea Griffthsii 68
Draba 63
Drymaria 159
Drymaria 62
Drymaria Blasiana 125
Drymaria crassifolia 124
Drymaria subsessilis 125
Drymaria Tepicana 124
Eriogonum exaltatum 61
Eriogonum deserticola 61
Erythea 50
Erythea Brandegei 61
Erythea armata 60
Erythea edulis 60
Echinocactus Falconeri 132
Eschscholtzia Californica 62
Euphorbia Brasilensis 130
Euphorbia eriantha 143
Euphorbia floccosiuscula 145
Euphorbia geniculata 143
Euphorbia nigro-purpurea 145
Euphorbia Preslii 130
Evolvulus ramulosus 149
Fernald 14

Festuca Jonesii 58
Fouquieria peninsularis 130
Franseria 155
Franseria Bryanti 155
Galium nitens 153
Godetia latifolia 68
Greggia 67
Greene 25
Haplopappus 73
Hedeoma gracillima 150
Hesperocallis undulata 58
Himantostemma Pringlei 124
Houstonia asperifolia 153
Iodanthus striatus 126
Inga megacarpa 140
Ipomoea equitans 149
Iva Nevadensis 157
Ixtlania acicularis 151
Jepson's Flora 2
Justicia clavata 131
Kosteletzkia bracteosa 147
Leucaena nitens 136
Leptosyne gigantea 73
Life Zones 33
Linum gracilentum 148
Lobelia Cotensis 152
Lobelia regalis 152
Lotus ramulosus 138
Ludwigia Tepicana 131
Lopezia globosa 147
Lopezia laciniata 147
Lupinus Bartolomei 142
Lupinus Lagunensis 141
Lyrocarpa Coulteri 66
Lupinus rotundifolius 142
Malpighia Sonorae 128
Mamillari 132
Mamillaria 130, 131
Mamillaria Heyderi 131
Melampodium hispidum 156
Melampodium Durandi 156
Melampodium minimum 156
Mexianthus 154
Mexico 76
Mimosa Mazatlana 133
Mimosa aspera 133
Monardella Lagunensis 151
Nelson and Life Zones 35
Nelson's Flora 31
Nontechnical Descriptions 80
Notes and New Species Mex. 123
Notes and New Species U.S. 46
Notes on Caryophyllaceae 158
Notes on Cosmos 71
Notes on Draba 63
Ononis crotalarioides 138
Paeonia 68
Papaya Carica 145
Passing Botanists 74
Pentstemon flaviflorus 124
Perezia foliosa 154
Phaseolus atomiferus 136
Phaseolus sanctorum 140
Plagiobothrys Jonesii 70
Plantago hirtella 132
Physaria 67
Pedicularis Tepicana 150
Phyllanthus orbiculatus 142
Phyllanthus peninsularis 143
Polygala apopetala 131
Pseudolopezia 147
Ranunculus 159
Rydberg's Flora 9
Scutellaria 71
Shrubs and Trees of Mexico 156
Sida ampla 146
Silene multinervia 159
Silene multinervia 63
Sphacele hastata 152
Stellaria 62
Stellaria 158
Stylosanthes prostrata 133
Tantillas Canon 36
Tidestrom's Flora 20
Tuckermannia gigantea 74
Tournefortia Tepicana 147
Tuckermannia maritima 74
Venegasis carpesioides 72
Verbesina grandis 154
Viguieria deltoides 155
Viscaionia geniculata 128
Washingtonia 46, 53
Washingtonia filifera 146
Washingtonia filifera 60
Wedelia 124
Wislizenia 125
Yucca australis 59
Yucca australis 146
Yucca brevifolia 58
Yucca Whipplei 59
Zauschneria 36
Zexmenia epapposa 155

Botanical Publications of Marcus E. Jones.

Excursion Botanique, out of print.

Contributions to Western Botany No. 1, Zoe II 12-17

Contributions to Western Botany No. 2, Zoe II 336-252. $.25.

Contributions to Western Botany No. 3, Zoe III 283-309. $.25.

Contributions to Western Botany No. 4, Zoe IV 22-54. $.50.

Contributions to Western Botany No. 5, Zoe IV 254-282. $.50.

Contributions to Western Botany No. 6, Zoe IV 366-369. $.25.

Contributions to Western Botany No. 7, Proc. Cal. Acad. Ser. 2 Vol. V 611-734. $1.50.

Contributions to Western Botany No. 8 pp. 43. $.50

Contributions to Western Botany No. 9, Zoe V 41-57. $.25.

Contributions to Western Botany No. 10 pp. 90 and 17 plates. Allium and Nyctaginaceæ. $1.50.

Contributions to Western Botany No. II pp. 22 $.25.

Contributions to Western Botany No. 12 pp 100. $1.00.

Contributions to Western Botany No. 13 pp. 87. $1.00

Ferns of the West, 30 pp. $.50.

Willow Family of the Great Plateau. $.50.

Montana Notes. $1.00

Systematic Botany, Zoe IV 374-379.

Contributions to Western Botany No. 14, $.75.

Contributions to Western Botany No. 15, $1.50.

Astragalus pp. 326, plates 72, $5.00.

Fundamentalism pp. 12, Free.

Previous articles published as notes in Botanical Gazette and Torrey Bulletin are not included here as they are out of print.

581.979
J72c
no. 16

CONTRIBUTIONS to

WESTERN BOTANY NO. 16.

MARCUS E. JONES A. M.

BIOLOGY

Issued Feb, 17 1930. Claremont Cal.

BOTANIZING IN ARIZONA

Some thirty-six years ago I spent a delightful month in the Catalina, Santa Rita, and Huachuca mountains of Arizona, during the period of summer rains. The flora was a garden all over the region. I spent a week at Fort Huachuca, but I did not get to visit the northern end of the Huachucas where Lemmon had spent a month and got a number of new species, and several Mexican species not before known in the U. S. For this reason I have always wanted to make a more thorough examination of the Huachucas. Recently I also learned of botanical work in the Baboquivori mountains which had turned up other Mexican species. So in September and October, 1929, I had a month's leisure and made the trip detailed below.

On September 16, 1929, I left Claremont, California, driving to Mecca, where I stayed over night. There were no flowers of interest on the way, due to the dryness. On the 17th there was little of interest on the way till I passed over the divide east of Shafer's well, here and there were little patches of green, due to recent rains, where Euphorbias had come up. At the Hayfields, a few miles farther east, I searched for annuals among the Mesquit, creosote bushes and Holacantha Emoryi. I found much Boerhaavia, annual Bouteloues, Hilaria rigida, and Tribulus. There was little else in bloom. Holacantha was in fine fruit with the grape-like clusters erect at the ends of the spiny stems. This is the most forbidding shrub of them all, being 6-10 feet high and much and intricately and rigidly branched, and each branch ending in a sharp spine. The whole mass forms a clump about twice as high as wide, and is shunned by all animals. The plants are leafless and with green stems, slow growers and with very hard wood. The trunks rarely get over 4 inches thick, and have rather thin bark somewhat shreddy on the older parts.

Going east toward Desert Center green patches were more frequent and in a few places there was much grass that had come up since the

rains. It should be remembered that there had been practically no rain west of Shafer's well except one hard shower a week or two ago. East of there a few showers had wet the ground somewhat and encouraged plants to grow here and there where water had fallen, and the tracks of the showers could be seen in the green that came up after them. As I went eastward the evidences of moisture increased somewhat but at no place had there been anything like a bountiful supply of water.

On the hillsides just east of the Colorado river near Blythe were a few Euphorbias, but only in patches. Going over the hills on the road to Quartzite a few things of interest were in bloom, and there were several species of Euphorbia growing flat on the ground. At a distance they all look alike, but on closer inspection I found at least three species. There was a brown leaved one flat on the ground, corresponding to E. serpyllifolia. Then there was a lemon-yellow one raised a little above the ground but spreading out flat that also had the character of serpyllifolia. Then there was another species (setiloba) that was very hairy and seemingly glandular, and flat on the ground. Occasionally perennials would appear of the Fendleri group.

It had been threatening rain all day, and finally about dark the rain began to pour down, and the wind blew a gale. I spent some time there getting what was in bloom. The next day the ground was covered with many pools of water and the road was washed out in places. I had two main objects of the trip. One object was to visit the S. H. mountains some 20 miles south of Quartzite, where in the previous December I had gone to see the desert palm that Cook had called Washingtonia Arizonica. These are the highest range of western Arizona and should have plants of interest on them. I drove along the blind road seeking a turnoff to go to them, but all signs had been washed away and I missed the place to turn out into the brush and went on some ten miles before I was sure I had missed the place. Conditions were not very attractive any way and so I decided to pass them by, and went on to Dome, where the main overland road east of Yuma passes, and by night landed at Mohawk, where I did some collecting. Conditions were still bad, for there had been very little rain, but as I went eastward things gradually got better till at Ajo grass was everywhere among the brush, and many plants were coming in. From Ajo I turned south over the new cutoff toward Tucson instead of going to Gila Bend. Toward night I came to Sells, which is on the Papago Indian reservation. My main objective was the Government station on the Baboquivori mountains, and Sells was the nearest on the main highway. I was directed to go to Pawi, an Indian school, and then turn east for the mountains, which towered up to the east. It was a little skittish going blindly far away from anywhere on the Tropical desert, and night coming on. But I knew if I did not find the place I could camp in the brush and return the way I came. At the school the priest told me to take the main traveled road wherever there was a fork and not to go to the right (which was toward the mountain). By and by it got dark, and the road steadily worse, but I kept bumping along, following my nose. At last I saw a

white gate ahead which meant a station. Driving up to the spacious house I sang out and knocked but no response. I decided to drive into a shed and camp. Just then an Indian came up and said he was the caretaker, and everybody was away. He asked me if I had a key. I said "yes," and so I tried the door with my pass key and it opened. So he told me to go in and make myself at home, which I did. It was still baking hot. The next morning I browsed around and found that a woman kept house there and everything was handy for getting one's own meals, and which I proceeded to do.

After breakfast I took my portfolio and struck out for flowers. It was a vegetable paradise, flowers everywhere and in great variety, all in the Tropical life zone. I soon had every drier full and an overflow. It took me three days to get the entire flora near the station. Then it rained. The floodgates of heaven opened and the water just poured down in sheets and everything was afloat. I never saw such a storm. In half an hour it was all over and nature smiled again just as though she had never kicked up her heels. The next day it rained just as hard for an hour and at the same time of day. The dry wash that drains the region and usually is a dry sand bed 30 feet wide, was now 60 feet wide and with a great torrent of raging water four feet deep, tearing up everything in its wake. In four hours afterward everything smiled again just as before and the wash was dry. I anticipated much trouble in crossing the wash the next day on my way out, but had no grief.

The region about the station is Tropical, the vegetation being mesquit, and creosote bush along with some Chilopsis, catsclaw (Mimosa and Acacia), etc., along the wash which is an open valley a few hundred feet below the general mesa region which slopes quickly into it. The topography of the region shows that it is very old geologically. The range, the Baboquivori, from which the region was derived by erosion, is still little more than a hogback rising half a mile into the sky and which runs some 50 miles north and south and slopes sharply into the mesa region, and its canons are short and sharp, but with few real cliffs, and with rather wide boulder strewn beds, where water crops out wherever the slope flattens down a little, and then disappears again in the sand. There seem to be no perennial streams. Whatever water there is goes mostly to the plain by underground seepage. Around the water there are some cotton woods (Populus Fremonti) and black willow (Salix Bonplandiana) and ash. As we get really into the higher canons there come in the live oaks. The elevation of the station is hardly 3,000 feet above the sea, and for this reason it is very hot, and there is no snow and little frost. The formation of the country is mostly eruptive, and the ground is covered with this debris in the form of gravel and sand. There is no sod, the perennial grasses growing in tufts. The soil is heavily impregnated with iron and therefore is red. About a quarter mile above the station, east, the eruptive rock crops out in low cliffs and rocky draws, forming shelter for many ferns. It is here that Erythrina grows along with Eysenhardtia. Erythrina reminds one very much of the red bud, but the pods are quite different,

reminding one of Pithecollobium dulce. The ferns are Northolaena sinuata and Hookeri. The latter spreads by underground rootstocks in all directions and forms large areas often 6 feet in diameter, with single stalks scattered throughout. Cheilanthes Lindheimeri abounds at the foot of rocks. The ground in all directions is covered with innumerable tufts of grasses which were in full bloom. Andropogon saccharoides was rather common among the rocks. Bouteloua polystachya, hirsuta, bromoides, and racemosa were common and mostly ripe, the spikelets making annoying stickers in the stockings as they fell off as one walked through the grass, and worked through to the skin. In the flat areas Leptochloa dubia was frequent. Muhlenbergia debilis was everywhere. M. Porteri was among the rocks and brush. Aristidas were very common in tufts. Epicampes distichophylla and rigens were frequent, particularly among the rocks and on slopes. Distichopylla is a very conspicuous grass growing in big tufts 3-4 feet high, with its waving plumes of flowers. Eragrostis lugens was still more common on slopes. Pappophorum apertum and Lycurus phleoides were also common. There was an Arundo-like grass out of flower and fruit, rather common among the rocks. On the plains Yucca elata was common, Yucca macrocarpa was less common, but they did not extend up on the mountain sides. Dasylirion erumpens was frequent among the rocks. In the draws where there was some moisture Salix Bonplandiana occurred along with Populus Fremonti, and Celtis occidentalis. On the slopes near the water holes was Aristolochia Watsoni and Acalypha Virginica. Allionia incarnata was common. Boerhaavia intermedia and scandens were quite common. Gomphrena nitida and Rivina phytolaccoides were occasional. I was surprised to find Iresine celosioides rather common. Eriogonum Wrightii was scattered over the hills. Portulaca suffrutescens was quite common among the rocks. Also Talinum paniculatum. Euphorbia serpens, a rooting perennial, which Standley calls an annual, was frequent along the sides of little draws and conspicuous from its abundance of foliage and scanty fruit. Other species were E. hypericifolia, and pediculifera, and chaetocalyx. Simmondsia was scattered over the hills. Cassia nictitans was rather common in open places with other weeds. Erythrina was the characteristic shrub growing among the rocks, along with Eysenhardtia orthocarpa and Cologania longifolia, and Phaseolus acutifolius and tenuifolius. Dalea formosa was common, and Crotalaria lupulina. Desmodium batocaulon, Metcalfi, and Neo-Mexicanum were frequent. Occasionally I saw Philadelphus microphylla and Dodonaea viscosa. Ayenia pusilla and Californica were common. Ingenhouzia triloba was found now and then along stream-beds. Echinocactus acanthodes and LeContei occur scatteringly. The creosote bush is everywhere. The wild Muskmelon, Apodanthera, is common, as is also the climbing wild cucumber, Echinopepon Wrightii. The wild ground cherry Physalis lobata and Wrightii occurred. Wild morning glories were common in 3 species. Verbena perennis grew on the hills. The Mexican species Ruellia tuberosa, and Parryi, and Tetramerium hispidum and Ecliptera Torreyi grew in the shade of bushes. Another Mexican plant was Plumbago scandens climbing

among the bushes. A new shrub, Amorpha, grew along with Eysenhardtia. The Cosmos-like Bidens Bigelovii was frequent in the shade. Trixis angustifolia bushes were seen now and then. Zinnia pumila was frequent. Porophyllum macrocephalum was rare. Eupatorium incarnatum grew in the woods. Parthenium incanum, the rubber plant, Guayule, was found now and then on the plain. There were a few goldenrods and asters. Brickellia Rusbyi occurred now and then, a shrub. Gymnolomia multiflora was frequent. An interesting plant was Eupatorium solidaginfolium. Another puzzling plant that looked so much like a sunflower was Tithonia Thurberi.

The mountain was clad half way up with live oaks which came down to the lower levels only in the canons. The farther one went up the mountain the less interesting the flora became. The luxuriance of the mesa flora was very great, and it was clearly Mexican.

It was my intention to go to the top of this range before I left the region, after I had gone over the mesa flora thoroughly. So I pulled out, intending to go up the second canon as far as possible with my car, and then camp and go afoot from there. I had taken one trip horseback to the first big canon south of the station, and had reached water and the lower mountain flora, but it was a very hard trip to make. So I pulled out in the morning and drove toward Pawi, expecting to find some road cutting off, but there was only one going to the first canon. So I went to Pawi and there was informed that a road went through the brush in that direction. So I explored and finally, after trying two, I took one that led me far out toward the mountain through the brush. On the way I got several interesting species. Then the road, after cutting across an impossible wash, was turned north and finally merged in the road on which I came out in the morning. So I decided not to waste any more time, and struck out for Sells and Tucson, and on the way was drenched by another terrific rainfall. I spent a day at Tucson repairing a spring and drying out. Then struck out for the Huachuca mountains some 80 miles southeast near Tombstone. On the way the Yuccas were much in evidence, the tree-like elata and the lower macrocarpa. The latter was manifestly different from our Mohavensis in the fine threads near the base of the leaves, and in the variation in the thickness which was verging toward Schottii, but the difference between it and Schottii was not as marked as one would wish. On the higher mesas I found a Juniperus that was not Californica nor Utahensis, for the bark was more that of Virginiana except that of the twigs which were not cross-cracked or reddish. I had to assume that this was J. occidentalis. I knew it could not be pachyphloea. As I approached Benson there was much less shrubbery and more grass, and the region was far more prairie-like than westward, in fact it was a great prairie. The presence of Bouteloua trifida and apparently oligostachya was a contributing factor. At this place there came in a Lepidium Thurberi which was quite marked because of the pearly white flowers. By the roadside was the ubiquitous Salvia lanceolata, Hymenatherum pentachaetum, the Mexican Flaveria repanda, Ambrosia trifida. This is what Gray calls the var.

Texana but it does not seem to warrant varietal rank. There was also Verbesina Wrightii and Gymolomia multiflora.

After collecting some at Benson and along the way, I reached the malodorous Tombstone, of the long ago. It is now a rambling shack of a town, inhabited by left-overs mostly, and with nothing to remind you of its "glory" in the days of noise and bluster, saloons and fast women. Prohibition has taken the starch out of many an old time moral eyesore among the towns of Arizona, and made them more or less decent though dilapidated. From here the road, a one-track wagon road, ambles over the hills, and down to another famous old place, Charleston, along the river on the edge of the valley. It is now mostly one house and a few shacks, its glory having departed. Then as one slips along the road over the vast plain, he is taken back in his imagination to the beautiful prairies of Iowa two generations ago, where as far as the eye can reach is grass and beautiful flowers. The great north end of the Huachucas looms to the south and the various canons begin to take shape, Miller, Cass and Ramsey canons. Miller canon is the largest and is a great ampitheater with nearly vertical walls at the south which rise up into the Pine belt above the live oaks. Cass Canon is a short and obscure one just to the west of Miller, and then comes Ramsey Canon, a winding and rather steep gulch going up to the very crest of the range, and having a beautiful stream of water flowing its entire length. This is where Lemmon, some 35 years ago, spent a month botanizing and collected a number of new species, and quite a number of Mexican plants not known to exist in the U. S. before. Some 34 years ago I spent a week at Fort Huachuca, which lies among the live oaks on the lower flanks of the range and some 20 miles farther south, but I did not get into Ramsey Canon. I have always desired to get into this particular canon, but never had the opportunity before.

There were ranches scattered over the plain, and several summer residences were found along the creek as I rambled up and out of the plain into the sycamores and walnuts and willows and cottonwoods that lined the creek. At last, several miles up, I came to James's resort, where there is an orchard and summer cottages embowered in shade. Just beyond is Brenner's, another resort, among the live oaks. The elevation was 5,500 feet above the sea, but still in the Tropical life zone. The wealth of flowers was even greater than in the Baboquivori, and decidedly different th many ways. At my back door was Delphinium scopulorum growing vigorously and three feet high. Near by was Erigeron Philadelphicus, also in the shade of the trees along with the splendid Cacalia decomposita, and the equally beautiful Senecio Hartwegi, the latter reminding one of the Mexican species. These were not the scrawny things one would expect in the hot regions but ample and luxuriant species. Across the stream and on drier slopes but under the shade of trees grew Yucca Schottii, just as it does in Lower California at the Cape. It is the only Yucca that grows in the shade of other trees. The trunks are usually six feet high but sometimes reach eight feet, and are covered with the reflexed leaves which are often nearly three feet long, glacuous-green, flattish, contracted below,

rather flabby and without threads, or with a few near the base which are fine and not coarse as in baccata. The panicles are sessile, about as long as the leaves, and the fleshy pear-like fruit is about half a foot long and three inches wide and with conspicuous and edible outside pulp, and pendent. It is seldom that any ripe fruit is seen for they are perforated in many places by worms. Growing along with it, but mostly in the sun, is an Agave of the Americana type. On the ground in the open places were many annuals such as Panicum sanguinale, Aegopogon Acalypha Neo-Mexicana, Chenopodium botrys, Monnina Wrightii, Euphorbia dentata, Phaseolus tenuifolius, Crotalaria lupulina, Houstonia angustifolia, Crusea sublate, Cuphea Palmeri, Linum Neo-Mexicanum, Schkuhria Wrightii, Valeriana sorbifolia, Carminatia tenuiflora, Galinsoga parviflora, Apolopappus gracilis, and the last Centaurea Americana appearing as if introduced.

Among the perennials at 5,500 feet altitude the most common grass was Panicum bulbosum, growing in large clumps. Setaria glauca was introduced, as was Sonchus oleraceus. One of the most striking grasses was Agropyron Arizonicum, often 6 feet high and growing in small tufts. Andropogon chrysocoma and furcatus were common. So was Epicampes distichophylla and macroura. Erogrostis lugens and pilosa, Orizopsis micrantha, Commelyna dianthifolia, Cyperus Schweinitzii, Salix taxifolia, Quercus hypoleuca and grisea, Acalypha Lindheimeri, Tragia nepetifolia and ramosa, Oxalis amplifolia, Erigonum annuum, and Wrightii. Silene laciniata, Sisymbrium Vaseyi, Draba petrophila, Berberis Wilcoxi, Euphorbia flagelliformis, Argythamnia Neo-Mexicana, Calliandra eriophylia, Desmodium Arizonicum. Bigelovii, Grahami. Tephrosia leucantha, Lupinus ampulus, and Palmeri, Philadelphius argenteus, Cercocarpus brevifolius, Rubus rubricaulis and ursinus, Agrimonia striata, Heuchera sanguinia, Gaura parviflora, and gracilis, Aralia bicrenata, Galium Rothrockii, Gentiana Wrightii, Ipomoea hederifolia, and cardiophylla, Geranium Carolinianum, Acer grandidentatum, Agastache Mearnsii, Hedeoma oblongifola, Pentstemon barbatus, Mimulus cardinalis, Verbena hastata, Fraxinus attenuata, Arbutus Arizonica, Gila aggregata, Lobelia cardinalis, Heterospermum pinnatum. Hieracium Fendleri, Perityle coronopifolia, Tagetes Lemmoni, Carminatia tenuiflora, Rudbeckia laciniata, Stevia Plummerae, Eupatorium Arizonicum, Erigeron Neo-Mexicana, Xanthocephalum Wrightii, Brickellia venosa, reniformis, grandiflora, chenopodina, floribunda, Rusbyi, Encelia exarata, Senicio Hartwegi, Verbesina longifolia, Heliopsis parvifolia.

About half a mile above James's place the creek enters a canon which is a real box, several hundred feet deep and about 100 yards long and about 6 feet wide. On the rocks of this canon grow Draba petrophila and Perityle coronopifolia. Just as one gets out of the upper end of the box he comes into luxuriant flora of herbs and shrubs. It is here on the steep slopes where the ferns abound. Almost the entire surface, including the loose rocks, have ferns peeping out from every nook. Here I found Polypodium thysanolepis, which at first looks like the dwarf form of vulgare, but the under surface is clad with scales. Here and there is a long stalk

of Notholaena sinuata. There are large patches of N. Hookeri. Under almost every rock are long lines of Cheilanthes tomentosa and Fendleri and among these plants grow Pellaea marginata, which forcibly reminds one of C. Californica. One does not wonder that it was placed in Cheilanthes. Then scattered through the mass is the remarkable Pomatophytum. Following up the canon a few miles we come to permanent cliffs of limestone or quartzite in whose crevices I found Asplenium Trichomanes, which is about half way between true Trichomanes and the var. incisum which Maxon has called vespertinum. Here also I found Cheilanthes Fendleri. Along the roadside I also found, near a slip, a single specimen of Achroanthes porphyrea. It looks almost like the twablade. The farther up the canon I went the less interesting the flora became. All along were scattered Centaurea Americana, acting just like an introduced plant.

It is manifest from the trails that the mountains have been the resort of men for ages. Such running water could never be neglected, in this waterless region, by the aborigines.

The canon is steep above James's and hard to negotiate, but at one time there was a wagon road up it for miles, the track being washed out above James's place now. It is evident that this range was for long a great rendesvouz for Apache Indians, and led to the establishment of Fort Huachuca, 20 miles south, on the flanks of the range. Now every little spring and stream is appropriated by ranchers and we see cultivated fields.

It may not be well known that Arizona and New Mexico are subject to a conspicuous summer rainfall, beginning in June and ending in September. This is a continuance of the rainy season of Mexico, and it feathers out near the Grand Canon. It does not seem to extend quite to Yuma but goes as far as Ajo. This was the reason for my visit in the middle of the very hot summer, when all California was as dry as could be.

The matter of life zones is paramount with me, and I try to get a clearcut idea of the zones in every region that I visit. Throughout most of Arizona and New Mexico there is no question of the limits of the zones because one only has to observe the presence of Larrea to know that it is Tropical. But after certain elevation is reached we come into the belts of live oaks where the flora changes somewhat and one is led to think that they represent the Juniper (Lower Temperate) zone. But in checking up I find that what seems like the Tropical continues entirely through this belt at least to an elevation of 6,500 feet altitude in the Huachucas and Baboquivoris. In the north end of the Huachucas the trouble is accentuated by the ravines and heavy growth of timber, permitting forms to grow in suitable places that are manifestly Middle Temperate, such as Delphinium scopulorum, Brickellia grandiflora, etc. Pinus Chihuahuana and Pinus cembroides are scattered through the live oaks. The first pine is manifestly an ally to Sabiniana, which grows in California in the upper Tropical. But the second is not like any northern species and cannot be compared with edulis and monophylla, as has been done by others. I did not get higher than 6,500 feet altitude in the Huachucas, and therefore am not prepared to say what are the limits of the upper zones.

After getting most of the flora at Ramsey Canon I pulled out for home, but went over to Miller Canon and did a little botanizing there. There I found Notholaena ferruginea and Hookeri, Cheilanthes myriophylla, Elionurus barbiculmis, Cyperus Schweintzii, Gomphrena caespitosa, Mollugo cerviana, Sisymbrium Vaseyi, Amorpha ovalis, Zinnia grandiflora, Perezia nana on the mesa below Miller Canon and clearly a perennial. Also along the roadside I found Heterotheca subaxillaris.

Returning to Tucson the way I went I then turned off toward Phoenix, passing through Sacaton, by way of Picacho Pass. I found a few things along the road. Then I passed on over to the Hassayampa and followed up it to Wickenburg. But there was little of interest there because of the lack of rain. West of Wickenburg on the hills I saw growing, just as Holacantha does in California, the rare shrub Canotia holacantha. It was in full fruit. This ended my botanizing on the trip.

LIST OF 1929 PLANTS

Mosses. 24663 Benson under junipers. 9-27, 1929. Arizona.
24664 Ramsey Canon, Huachuca mountains. 9-29, 1929. In forests of live oaks.
24665 Ramsey Canon, Huachuca mountains, Arizona. 9-30, 1929. In live oaks.
24666 Ramsey Canon, Huachuca mountains, Arizona. 9-29, 1929.

Equisetum laevigatum. 24667 Ramsey Canon. 9-28,1929. Along creek in swampy places, in timber, Huachuca mountains, Arizona.
24668 Same. 9-28, 1929. Same locality.

Abies concolor 24669 Ramsey Canon, Huachuca mountains. 9-30, 1929. 6,000 feet altitude. This is the only fir, and is common.

Juniperus pachyphloea 24671 Ramsey Canon, Huachuca mountains, Arizona. 9-26-1929. A symmertical tree, with oak-like bark, and somoth twigs.

Juniperus occidentalis var. monosperma. West of Benson, Arizona. 9-27, 1929. Among the creosote bushes. A small tree, 10-15 feet high, and bushy, with close bark in long layers, but not shredding up as in Utahensis. The larger twigs smooth. Branches from the ground. No. 24670.

Pinus cembroides. 24672 Ramsey Canon, Arizona. 9-28-1929. The sheaths of this species are very short.

Pinus cembroides as given above does not seem to me to be very near to P. edulis, nor do edulis and monophylla seem to me to be varieties of it. The general habit of the tree is like them, but the leaves are nearer those of Chihuahuana. They have the same deciduous sheaths and slenderness though less than half as long, and are in threes, not twos as in edulis.

Pinus Chihuahuana. No. 24673. Among the live oaks near the upper edge of the Tropical life zone, on slopes. This plant has almost exactly the habit of Pinus Sabiniana. The foliage has the same airy tint and appearance, being relatively sparse and glaucous. The leaves are mostly 3, rarely 2 or 4, and 2 cm. long by ½ mm. wide, with the outer surface very convex and the inner very concave and with a prominent central nerve, with tip very sharp. The blades are flexuous and soft and widely spreading. The cones resemble in a general way those of flexilis but only half as long. The sheaths are very thin and lacerate-fibrous on the margins and chestnut-colored. The trees are like those of P. Murrayana, straight and tall. Ramsey Canon, Huachuca mountains. September 29, 1929. Cones hang on for some years.

I collected all the ferns I saw growing except the Brake, which was common at upper elevations.

Polypodium thysanolepis. This unique Mexican fern, first got by Lemmon in the same region in the U. S., makes one think the moment he sees it that he has found the ubiquitous vulgare, for it has the same habit

and size of the reduced form found in the Wasatch mountains, Utah. But its scaly under surface and single row of big sori differ. The scales are dull chestnut-colored and acuminate and lacerate and conspicuously depressed appressed below, and mostly have the appearance of being an indusium for the fruit dots as well as detached scales. Ramsey Canon, on rocks in crevices among the live oaks. No. 24674. September 28, 1929.

Asplenium Trichomanes. No. 24675. Ramsey Canon, Huachuca mountains. September 30, 1929. Rather common on rocks among the live oaks. The form of this species, common, here is more like that of the east than of California and western Mexico, which Moore called var. incisum and which Maxon has raised to specific rank under the name of vespertinum. I cannot see any good reason for making a species of it.

Pellaea atropurpurea. No. 24676. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. On rocks along with Cheilanthes. In shady places.

Cystopteris fragilis. No. 24667. Ramsey Canon, Huachuca mountains, Arizona. September 30. 1929. I think Christensen was right in reducing Underwood's Filix, which was a resurrection of Adanson's genus Filix, which never had any species attached till after Bernhardi created Cystopteris. This species is rather common on slopes and around springs, and reaches nearly 2 feet in hight. It is one of the prettiest of the ferns. I also saw it in the Baboquivori mountains, but did not collect it.

Woodsia Mexicana. No. 24678. Ramsey Canon, Huachua mountains, Arizona. September 28, 1929. Common among loose rocks on slopes, and with the habit of Cystopteris, but growing in more open places. This has the common characteristic of all the other Woodsias that I know, that of being pruinosely puberulent throughout, and which is about the only means of determining which genus it is without recourse to the microscope. This species is quite variable and may run into W. obtusa (W. Plummerae). The indusium is conspicuous always, ending in long hairs.

Notholaena ferruginea. No. 24679. Miller Canon, Huachuca mountains, Arizona, October 1, 1929. In crevices of rocks in open places. Tropical. This is a very pretty fern, growing in dense tufts because of the shortly branching rootstocks. The rootstocks and lower stalks have dark-chestnut, hair-like scales in addition to the somewhat woolly hairs which cover the whole plant, and which are silvery white at first. The fronds often become 2 feet long, but rarely over 2 inches wide, and taper to the tip, and are very unlike any other species. Also No. 24680. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Notholaena sinuata. No. 24681. Baboquivori mountains, Arizona. September 20, 1929. In open places among rocks and in crevices.

Notholaena Hookeri. No. 24682. Miller Canon, Huachuca mountains,

Arizona. October 1, 1929. Also No. 24683. Baboquivori mountains, Arizona. September 19, 1929. In open places, Tropical, growing in large areas and spreading from underground rootstocks.

Pellaea marginata. No. 24684. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. Growing along with Cheilanthes myriophylla and Alabamensis on slopes among loose rocks in open places. Tropical. This is the most interesting of all the Arizona ferns because of its rarity and uniqueness. It reminds one at once of Cheilanthes Californica, and has much the same habit. One does not wonder that it was placed in Cheilanthes. It has no place in Pellaea. It also reminds one of Cryptogramma acrostichoides and Stelleri.

Cheilanthes myriophylla. No. 24685. Miller Canon, Huachuca mountains, Arizona. This is the most common of all the ferns, growing among loose rocks and in crevices along with Fendleri, and is conspicuous among the species of Cheilanthes through its rusty-colored scales and tomentum. Tropical. It is very variable and probably includes Lindheimeri.

Cheilanthes Lindheimeri. No. 24686. Baboquivori mountains, Arizona. September 19, 1929. In open places among rocks and in crevices. Very common. Tropical.

Cheilanthes tomentosa. No. 24687. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929. On slopes among loose rocks and in crevices. Tropical.

Cheilanthes Fendleri. No. 24688. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 29, 1929. In crevices of rocks. Tropical.

Cheilanthes microphylla. No. 24689. Baboquivori mountains, Arizona. Seeptember 20, 1929. This seems quite common in crevices of granite rocks. Tropical. It has the habit of lanuginosa. (Feei.)

Pomataphytum pocillatum. New Genus. Allied to Cheilanthes tomentosa, but with the habit of C. Fendleri. Fronds smooth above and green, 6-8 inches long, the stalk being half the whole, the whole frond below being covered with nearly straight chestnut-colored tapering hairs, which at the very base of stalk turn into narrow scales, the pinnules are destitute of hairs or scales except along the midrib are hairs. Fronds lanceolate in outline, tapering slightly below and much above, tripinnate, with pinnae about 10 pairs, the pinnules about 8 pairs and the final segments about 4 pairs in the middle of the pinule, and obovate and with the final one twice as long and often panduriform and mostly stalked. Indusium forming a complete pocket, open only below, which is separated from the margin of the frond by half its width and arises from the surface of the frond and not from the margin as in tomentosa. This white membrane gives the fronds a white appearance as if very pubescent. The fronds are more delicate than tomentosa. Growing in crevices of rocks and under stones above the box in Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929. Final segments coarsely crenate. No. 24690.

Also No. 120549. Pomona College herbarium, got by me at Guayanopa Canon, Chihuahua, September 24, 1903, at 3,600 foot altitude, in Tropical life zone on slopes. At first sight this fern seems to be Cheilanthes tomentoa or Fendleri, and grows with them but the indusium is entirely different and fills the whole of the pinnule, giving the young fronds a silvery appearance.

Notholaena tenera. Cheilanthes Jonesii Maxon. An examination of young material shows a distinct indusium, and this would place it in Cheilanthes. But to me the plant is as good a species of Pellaea as Notholaena. I do not know N. tenera and so do not know if Maxon's species is a good one or not. The species of ferns of the deserts and of southern California are in a bad state of confusion.

An examination of various material convinces me that Maxon's Cheilanthes siliquosa is not a good species; it is too near to California, and has intergrades. The same is true fo his Covillei, for it cannot be separated from Fendleri by any good character.

Cheilanthes Alabamensis certainly is a good Pellaea as Baker put it long ago. In the same class belong several Mexican species of Cheilanthes which are too near to Pellaea.

Cheilanthes gracillima was got by Baker at St. Croix Falls, Wisconsin, July 5, 1900, and is No. 23324, Pomona College Herbarium.

Panicum colonum. No. 24691. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. No. 24692. Boboquivori mountains, Arizona. September 19, 1929. Waste places.

Panicum hirticaule. No. 24693. East of Desert Center, California. September 16, 1929. Common along with Pectis.

Panicum Hallii. No. 24694. Baboquivori mountains, Arizona, September 23, 1929.

Panicum bulbosum var. sciaphilum. No. 24695. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. On hillsides, very common, and in the valley below.

Setaria caudata. No. 24696. Baboquivori mountains, Arizona. September 20, 1929. Perennial.

Setaria caudata var. pauciflora (Vassey) as Chaetochloa. No. 24697. Ajo, Arizona. September 18, 1929. No. 24698. Baboquivori mountains, Arizona. September 19, 1929. Common.

Setaria glauca. No. 24699. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. In waste places.

Panicum sanguinale L. No. 24700. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929. Annual.

Fern Notes Additional

Agropyron Arizonicum Scr. & Merr. No. 24701. Ramsey Canon, Huachuca mountains, Arizona, at 6,000 feet altitude, among the live oaks. September 30, 1929. This plant is rather unique. It is 4-6 feet high and erect but very slender, and with wand-like linear spikes and glaucous leaves. It is not stoloniferous but grows in small tufts of a few stems, and in open places. The glaucousness varies greatly.

Bromus marginatus. No. 24702. Arrowhead Lake, California, August 4, 1929.

Bromus Richardsonii. No. 24703. September 29, 1929. Ramsey Canon, Huachuca mountains, Arizona. Common.

Andropogon contortus. No. 24704. Baboquivori mountains, Arizona.

Andropogon chrysocomus. No. 24705. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. On prairies. No. 24706. Miller Canon, same region, October 1, 1929. Baboquivori mountains, Arizona. September 20, 1929.

Andropogon furcatus. No. 24708. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Elionuris barbiculmis. No. 24709. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Trachypogon Montufari. No. 24710. Ramsey Canon, Huachuca mountains, Arizon. September 30, 1929.

Andropogon saccharoides. No. 24711. Baboquivori mountains, Arizona. September 19, 1929.

Andropogon cirrhatus (?). No. 24712. Ajo, Arizona. September 18, 1929. Along creek bottom. Same as 22812 from Nogales. Rachis smooth.

Aegopogon geminiflorus var. unisetus. No. 24713. Ramsey Canon, Huachucha mountains, Arizona. September 29, 1929. Along roadside. A very delicate annual. Very poorly drawn in Beal's Grasses and in Grasses of the Southwest, p. 1, v. 12. It is clearly close to Hilaria.

Pappophorum apertum. No. 24714. Ajo, Arizona. Sept. 18, 1929. In dry wash. No. 24745. Baboquivori mountains. September 22, 1929.

Bouteloua polystachya. No. 24715. Ajo, Arizona. September 18, 1929. No. 24716. Hayfields, west of Desert Center, California. September 16, 1929. No. 24717. East of Desert Center. September 16, 1929. Common on flats. No. 24719. Sentinel, Arizona. September 18, 1929. No. 24724. Benson, Arizona. September 27, 1929.

Boutelous trifida. No. 24717. Benson, Arizona. September 27, 1929.

Boutelous bromoides. No. 24718. Baboquivori mountains, Aoizona. September 19, 1929.

Bouteloua racemosa. No. 24720. Baboquivori mountains, Arizona. September 19, 1929. Common.

Bouteloua aristidoides. No. 24721. Hayfields, west of Desert Center, California. September 16, 1929. No. 24722. Ajo, Arizona. September 18, 1929. No. 24723. Benson, Arizona. September 27, 1929.

Bouteloua oligostachya (?) No. 24725. Benson, Arizona. September 27, 1929. Everywhere.

Boutelous hirsuta. No. 24726. Baboquivori mountains, Arizona. September 20, 1929. Very common.

Leptochloa dubia. No. 24727. Baboquivori mountains, Arizona. September 20, 1929.

Leptochloa mucronta. No. 24728. Sells, Arizona. September 18, 1929.

Muhlenbergia debilis. No. 24729. Arrowhead Lake, California. August 4, 1929.

Cassia nictitans. No. 24884. Baboquivori mountains, Arizona. September, 19, 1929.
Cassia Covesii. No. 25021. Picacho Pass. October 2, 1929.
Erythrina flabelliformis. No. 24885. Baboquivori mountains, Arizona. September 19, 1929.
Desmanthus Jamesii. No. 25024. Baboquivori mountains, Arizona. September 22, 1929.
Hosackia Purshiana. No. 24886. Arrowhead Lake, California. August 4, 1929.
Trifolium involucratum. No. 24887. Tioga Pass, California. June 30, 1929. No. 24900. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Calliandra humilis. No. 25020. Sells, Arizona. September 18, 1929. No. 24888. Baboquivori mountains, Arizona. September 20, 1929.
Calliandra eriophylla. No. 24889. Baboquivori mountains, Arizona. September 20, 1929. No. 24890. Ramsey Canon, Huachuca mountains,
Eysenhardtia orthocarpa. No. 24891. Baboquivori mountains, Arizona. September 29, 1929.
Hoffmanseggia drepanocarpa. No. 24892. East of Desert Center, California. September 16, 1929.
Cologania longifolia. No. 24893. Baboquivori mountains, Arizona. September 19, 1929.
Phaseolus acutifolius. No. 24894. Baboquivori mountains, Arizona. September 23, 1929.
Phaseolus tenuifolius. No. 24895. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929. No. 25023. Baboquivori mountains, Arizona. September 19, 1929.
Phaseolus macropoides. No. 24896. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Dalea Parryi. No. 24897. Ajo, Arizona. September 18, 1929.
Dalea Grayi. No. 24898. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Dalea formosa. No. 25026. Baboquivori mountains, Arizona. September 19, 1929.
Crotalaria lupulina. No. 24899. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Amorpha ovalis N. Sp. No. 25027. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Desmodium Arizonicum. No. 24901. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Desmodium batocaulon. No. 24902. Baboquivori mountains, Arizona. September 19, 1929.
Desmodium Metcalfi. No. 24903. Baboquivori mountains, Arizona. September 19, 1929.
Desmodium Bigelovii. No. 24904. Baboquivori mountains, Arizona. September 23, 1929. No. 24905. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Desmodium Neo-Mexicanum. No. 24906. Ramsey Canon, Huachuca mountains, Arizona. September 27, 1929. No. 25022. Baboquivori mountains, Arizona. September 24, 1929.

Desmodium Grahami. No. 24907. Ramsey Canon, Huachuca mountains, Arizona. September 20, 1929.

Lupinus Andersonii. No. 24908. Tioga Pass, California, June 30, 1929. Mono Lake, California. June 29, 1929. No. 24910. Bear Lake, California. August 7, 1929.

Tephrosia leucantha. No. 24933. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Lupinus Palmeri. No. 24911. Ramsey Canon, Huachuca mountains. September 28, 1929.

Lupinus amplus. No. 24912. Ramsey Canon, Huachuca mountains, Arizzona. September 28, 1929.

Zornia diphylla. No. 25025. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Philadelphus argenteus. No. 24913. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Philadelphus microphyllus. No. 23914. Baboquivori mountains, Arizona. September 23, 1929.

Potentilla gracilis. No. 24915. Arrowhead Lake, California. August 4, 1929.

Cercocarpus brevifolius. No. 24916. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Chamaebatia foliolosa. No. 24917. Tioga Pass, California. June 30, 1929.

Rubus rubricaulis (W. & S.) No. 24918. Ramsey Canon, Huachuca mountains. September 30, 1929.

Rubus ursinus. No. 24919. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Agrimonia striata. No. 24920. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Heuchera sanguinea. No. 24921. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Krameria glandulosa. No. 24922. Castle Dome, Arizona. September 17, 1929.

Dodonaea viscosa var. angustifolia. No. 24923. Baboquivori mountains, Arizona. September 19, 1929.

Ayenia pusilla. No. 24924. Baboquivori mountains, Arizona. September 20, 1929.

Sphaeralcea angustifolia. No. 23925. Benson, Arizona. September 17, 1929.

Ingenhouzia triloba. No. 24926. Baboquivori mountains, Arizona. September 23, 1929.

Abutilon Texense. No. 24927. Baboquivori mountains, Arizona. September 23, 1929.

Abutilon malacum. No. 24930. Baboquivori mountains, Arizona. Sep-

tember 19, 1929.
Sida crispa. No. 24928. Baboquivori mountains, Arizona. September 19, 1929.
Sida Neo-Mexicana. No. 24929. Baboquivori mountains, Arizona. September 22, 1929.
Janusia Californica. No. 24931. Baboquivori mountains, Arizona. September 22, 1929.
Janusia gracillis. No. 24932. Baboquivori mountains, Arizona. September 20, 1929.
Argemone hispida. No. 24933. Mono Lake, California. June 29, 1929.
Houstonia angustifolia. No. 24934. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 30, 1929.
Gayophytum ramosissimum. No. 24935. Arrowhead Lake, California. August 4, 1929. No. 24937. Cushenbury Grade. August 4, 1929.
Epilobium paniculatum var. jucundum. No. 24936. Arrowhead Lake, California. August 4, 1929.
Epilobium adenocaulon. No. 24938. Arrowhead Lake, California. August 4, 1929.
Epilobium glaberrimum. No. 24940. Arrowhead Lake, California. August 4, 1929.
Boisduvalia densiflora. No. 24939. Arrowhead Lake, California. August 4, 1929.
Gaura parviflora. No. 24941. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Oenothera biennis. No. 24942. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Gaura gracilis. No. 24943. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Aralia bicrenata. No. 24945. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 29, 1929. This is very near to A. racemosa.
Sium lineare. No. 24948. Bluff Lake, California. September 2, 1929.
Carum Kelloggii. No. 24950. Arrowhead Lake, California. August 4, 1929.
Pseudocymopterus tenuifolius. No. 24951. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Podosciadium capitellatum. No. 24947. Bluff Lake, California. September 2, 1929.
Sanicula lacinata. No. 24946. Arrowhead Lake, California. August 4, 1929.
Galium Rothrockii. No. 24952. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Galium Aparine. No. 24953. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Echinocactus Lecontei (?). No. 24954. Baboquivori mountains, Arizona. September 20, 1929.
Echinocactus acanthodes. No. 24955. Baboquivori mountains, Arizona. September 25, 1929.

Opuntia leptocaulis. No. 24956. Benson, Arizona. September 27, 1929.
Petalonyx Thurberi. No. 24957. Ajo, Arizona. September 18, 1929.
Crusea subulata. No. 24958. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Apodanthera rigida. No. 24959. Baboquivori mountains, Arizona. September 20, 1929.
Echinopepon Wrightii. No. 24960. Baboquivori mountains, Arizona. September 22, 1929.
Larrea Mexicana. No. 24961. Benson, Arizona. September 27, 1929. No. 24965. Quartzite, Arizona. September 17, 1929.
Tribulus grandiflorus. No. 24962. Sentinel, Arizona. September 18, 1929.
Tribulus maximus. No. 24963. Hayfields, west of Desert Center, California. September 16, 1929.
Holacantha Emoryi. No. 24964. Hayfields, west of Desert Center, California. September 16, 1929.
Hibiscus denudatus. No. 24966. Baboquivori mountains, Arizona. September 20, 1929.
Gentinana Wrightii. No. 24967. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Malvastrum orbiculatum. No. 24968. Cushenbury grade, San Bernardino mountains, California. August 4, 1929.
Physalis Wrightii. No. 24969. Baboquivori mountains, Arizona. September 22, 1929.
Physalis lobata. No. 24970. Baboquivori mountains, Arizona. Septembeer 27, 1929.
Capsicum baccatum. No. 24971. Baboquivori mountains, Arizona. September 19, 1929.
Ipomoea hederifolia. No. 24972. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Ipomoea Lindheimeri. No. 24973. Baboquivori mountains, Arizona. September 19, 1929.
Ipomoea costellata. No. 24974. Baboquivori mountains, Arizona. September 22, 1929.
Ipomoea cardiophylla. No. 24975. Baboquivori mountains, Arizona. September 22, 1929. No. 24976. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Evolvulus linifolius. No. 24977. Baboquivori mountains, Arizona. September 19, 1929.
Evolvulus argenteus. No. 24978. Benson, Arizona. September 27, 1929.
Cuscuta Californica (?). No. 24979. Mohawk, Arizona. September 18, 1929.
Cuscuta curta. No. 24980. Baboquivori mountains, Arizona. September 9, 1929. No. 24981. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Cuscuta umbellata. No. 24982. Sentinel, Arizona. September 18, 1929.
Geranium Carolinianum. No. 24983. Ramsey Canon, Huachuca mountains, Arizona. September 19, 1929.

Acer grandidentatum. No. 24984. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Sphacele calycina. No. 24985. Near Santa Barbara. June, 1929.

Salvia lanceolata. No. 24986. Benson, Arizona. Seeptember 27. 1929.

Agastache Mearnsii. No. 24987. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Monarda tenuiaristata. No. 24988. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Cuphea Palmeri. No. 24989. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Scutellaria antirrhinoides. No. 24890. Baldwin Lake, California. August 17, 1929.

Monardella lanceolata. No. 24991. Temecula Bridge, California. July 13, 1929.

Monardella linoides. No. 24992. Baldwin Lake, California. August 17, 1929.

Hedeoma oblongifolia. No. 24933. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Verbena perennis. No. 24994. Baboquivori mountains, Arizona. September 19, 1929.

Castilleia linearifolia. No. 24995. Cushenbury Spring, San Bernardino mountains, California. September 17, 1929.

Castilleia miniata. No. 24996. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Castilleia parviflora. No. 24997. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Pentstemon barbatus var. labrosus. No. 24988. Arrowhead Lake, California. August 4, 1929. No. 25010. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Mimulus cardinalis. No. 24999. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Scophularia Californica. No. 25000. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Ruellia tuberosa var. occidentalis. No. 25001. Baboquivori mountains, Arizona. September 19, 1929.

Ruellia Parryi. No. 25002. Baboquivori mountains, Arizona. September 19, 1929.

Tetramerium hispidum. No. 25003. Baboquivori mountains, Arizona. September 22, 1929.

Diclipetra Torreyi. No. 25004. Baboquivori mountains. Arizona. September 20, 1929.

Apocynum pumilum. No. 25005. Arrowhead Lake, California. August 4, 1929.

Verbena hastata. No. 25006. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Linum Neo-Mexicanum. No. 25007. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Fraxinus attenuata. No. 25008. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 30, 1929.
Plumbago scandens. No. 25009. Baboquivori mountains, Arizona. September 19, 1929.
Arbutus Arizonica. No. 25019. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 30, 1929.
Coldenia Greggii. No. 25018. Castle Dome, Arizona. September 17, 1929.
Gilia aggregata. No. 25017. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 28, 1929.
Gilia intertexta. No. 25016. Cushenbury Grade, San Bernardino mountains, California. August 17, 1929. No. 25015. Bear Lake, California. August 17, 1929.
Gilia androsacea. No. 25013. Baldwin Lake, California. August 17, 1929.
Cryptantha micrantha. No. 25014. Baldwin Lake, California. August 17, 1929.
Heliotropium Curassavicum. No. 25012. Baldwin Lake, California. August 17, 1929.
Lobelia cardinalis. No. 25011. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 30, 1929.
Boerhaavia erecta. No. 24796. Hayfields, west of Desert Center, California. September 16, 1929.
Boerhaavia intermedia. 24797. Baboquivori mountains, Arizona. September 19, 1929.
Boerhaavia Coulteri. No. 24798. Hayfields, west of Desert Center, California. September 16, 1929.
Boerhaavia Wrightii. No. 24799. Hayfields, west of Desert Center, California. September 16, 1929.
Boerhaavia scandens. No. 24800. Baboquivori mountains, Arizona. September 19, 1929.
Allionia melanotricha. No. 24801. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Abronia villosa. No. 24802. Temecula Bridge, California. July 13, 1929.
Gomphrena nitida. No. 24803. Baboquivori mountains, Arizona. September 20, 1929.
Gomphrena caespitosa. No. 24804. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Rivina portulaccoides. No. 24805. Baboquivori mountains, Arizona. September 19, 1929.
Amarantus Torreyi. No. 24806. Castle Dome, Arizona. September 17, 1929.
Amarantus retroflexus. No. 24807. Miller Canon, Huachuca mountains, Arizona. September 29, 1929.
Iresine celosioides. No. 24808. Baboquivori mountains, Arizona. September 23, 1929.
Chenopodium Fremonti. No. 24809. Miller Canon, Huachuca mountains, Arizona. September 29, 1929.
Chenopodium Botrys. No. 24810. Miller Canon, Huachuca mountains,

Arizona. September 29, 1929.

Atriplex saccaria. No. 24811. Baldwin Lake, California. August 17, 1929.

Atriplex Greggii. No. 24812. Sacaton, Arizona. Otcober 2, 1929.

Atriplex expansa. No. 24813. Mohawk, Arizona. September 17, 1929.

Atriplex canescens. No. 24814. Mohawk, Arizona. September 17, 1929.

Mollugo Cerviana. No. 24815. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. Benson, Arizona. September 27, 1929.

Trianthema portulaccoides. No. 24817. East of Desert Center, California. September 16, 1929.

Oxalis amplifolia. No. 24818. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Alternanthera lanuginosa. No. 24819. East of Blythe, along the Colorado river, Arizona. September 16, 1929.

Alternanthera suffrutescens. No. 24820. Welton, Arizona. September 17, 1929.

Eriogonum ovalifolium (?). No. 24821. Baldwin Lake, California. August 17, 1929.

Eriogonum Wrightii. No. 24822. Baboquivori mountains, Arizona. September 23, 1929. No. 24823. Miller Canon, Huachuca mountains, Arizona. No. 24824. Ramsey Canon. September 27, 1929.

Eriogonum cernuum. No. 24825. Baldwin Lake, California. August 17, 1929. No. 24826. Cushenbury Spring, Arizona. August 17, 1929. No. 24827. Mohawk, Arizona. September 17, 1929. No. 24828. Benson, Arizona. September 27, 1929.

Eriogonum gracile. No. 24829. Bear Lake, California. August 17, 1929.

Polygonum Douglasii. No. 24844. Arrowhead Lake, California. August 14, 1929.

Silene laciniata. No. 24830. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Stellaria longifolia. No. 24831. Ramsey Canon, Huachuca mountains, Arizona. September 27, 1929.

Portulaca pilosa. No. 24832. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Portulaca suffrutescens. No. 24833. Baboquivori mountains, Arizona. September 19, 1929.

Talinum paniculatum. No. 24834. Baboquivori mountains, Arizona. September 19, 1929.

Thelypodium. No. 24835. September 30, 1929.

Sisymbrium Vaseyi (?). No. 24836. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. Stigma lobes over partition.

Sisymbrium Vaseyi. No. 24837. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Lepidium Thurberi. No. 24838. Benson, Arizona. September 27, 1929. No. 24839. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. This seems a good species from the brilliant white flowers and universal pubescence.

Erysimum elatum. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Arabis porphyrea. No. 24841. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929. This is a dubious species.

Draba petrophila. No. 24842. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929. This appears to be a good species, growing only on the rocks.

Streptanthus tortuosus. No. 24844. Mono Lake, California. June 29, 1929.

Wislizenia refracta. No. 24843. Sacaton, Arizona. October 2, 1929.

Oxytheca Parishii. No. 24845. Arrowhead Lake, California. August 4, 1929.

Berberis Wilcoxii. No. 24846. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 28, 1929.

Delphinium scopulorum. No. 24847. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Clematis Drummondi. No. 24848. Ajo, Arizona. September 18, 1929.

Monnina Wrightii. No. 24849. Ramsey Canon, Arizona. September 30, 1929.

Thalictrum Wrightii. No. 24850. Ramsey Canon, Huachuca mountains, Arizona. Seeptember 28, 1929.

Viola Canadensis. No. 24851. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Euphorbia serpens H. B. K. No. 24852. Babroquivori mountains, Arizona. September 22, 1929. No. 24853. Pichacho Pass. October 2, 1929. No. 24854. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. Curiously Wooton and Standley p. 398 of their Flora of New Mexico put this species under annuals, when it is a woody rooted and rooting perennial. This species is common on little slopes along rivulets or in gulches where there is good drainage in gravelly places. The mats often cover a space two yards wide, and they root at almost every joint, a character not found in any other species of Euphorbia. The internodes are rather long on the main stems and are filiform and smooth. The papery stipules are triangular and mostly entire and conspicuous. The leaves vary from obliquely oval to almost round, and are entire, rather leathery and obtuse, and mostly half an inch long when fully developed. The ultimate branches are short and with imbricated leaves, and with the mostly single flowers about sessile among the leaves. The pods are sharp-angled and smooth, and about 1.5 mm. long, the seeds are orange-colored, nearly 1 mm. long, rather narrowly oblong, but a trifle narrower at tip but not at all ovate, smooth, without any markings or pits, obtusely triquetrous and with rounded back and deeply furrowed face. The appendages are white or pinkish, reniform to obliquely and transversely oblong and about as wide as the pod is long, the glands are purple or black and transversely oblong. The inflorescence is terminal on the branches and always congested, and very late in blooming. The general appearance

of the plants is that of E. albomarginata, but without the white margined leaves, but that plant is never rooting at the nodes. The species is Tropical and is common probably as far north as Phoenix, and at least as far west as Sells, and eastward to Texas and southward. Wooton and Standley evidently followed Coulter too closely in making their keys. Coulter's keys are poor. I don't see how a plant could root at the nodes and be annual. The original description says it is an annual.

Euphorbia setiloba Eng. No. 24855. Quartzite, Arizona. September 17, 1929. This prostrate annual of the stictospora group, has exactly the habit of stictospora and serpyllifolia, and grows with the latter. Whole plant glandular-hairy throughout even to the pods when young, but there are no evident glands on the hairs, but they are evidently viscid and entangle grains of sand and stand out at right angles to the stem. Leaves thin, flat, wholly entire, obliquely ovate to oval, rarely 5 mm. long, opposite, several times shorter than the internodes. Stipules apparently absent or not distinguishable from the hairs. Pods strigose when young, mostly ciliate on the margins when old, about 1 mm. long and with rounded angles. Seeds 2/3 mm. long, ovate to ovate-oblong, whitish, sharply angled and angles not indented., then the faces concave and grooved with not over 6 sulci, and sometimes a little meshed. Appeendages conspicuous and white and lacerate into subulate hairs, the glands conspicuous and black-purple. This differs from E. stictospora and hirtula in the entire leaves and conspicuously lacerate appedanges. Stictospora has the long pubescence but is without appendages, and the leaves are serrate above. Hirtula has very much shorter pubescence, and has crenate and very narrow appendages, and obtuse angled and ovate seeds, and serrate leaves. I do not see any good reason for recognizing the segregates of Euphorbia as genera. The species of this group are too much involved to be good species.

Euphorbia vermiformis N. Sp. No. 24856. Ajo, Arizona. September 18, 1929. Along a dry wash. Perennials, tufted with filiform stems 2-3 feet long, and spreading or prostrate with alternate branches and very long internodes, and almost obsolete stipules. Whole plant ashy to the glabrous appendages which are obovate and 1-2 mm. long and white or pink and very conspicuous, the plant reminding one of E. corollata in that respect. Final branches an inch or two long and with about 3 pairs of leaves which are about an inch long, broadly linear to narrowly oblong, obtuse at both ends but not oblique, involute, entire. Pods with rounded angles, appressed-ashy with very short hairs 2 mm. long, single. Seeds about 1 mm. long, a little oblique, oblong, rounded and obscurely if at all angled but with the 4 ribs very low, and with 4 conspicuous and raised rings, like pediculifera, obtuse. The seeds would put this at once in the pediculifera group, and not in petaloidea, which the plant resembles much. At first sight one would think that this was E. revoluta, but the leaves are

wider and the seeds manifestly like pediculifera.

Euphorbia Missouriensis (Norton) No. 24857. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Euphorbia pediculifera Eng. No. 24858. Ajo, Arizona. September 18, 1929. The leaves of this species are broader and inclined to be reddish or brown above and green below. The seeds are oblong-ovate and acutish, and the appendages are narrow and not prolonged.

Euphorbia pediculifera. No. 24862. Baboquivori mountains, Arizona. September 19, 1929.

Euphorbia hypericifolia. No. 24859. Baboquivori mountains, Arizona. September 19, 1929.

Euphorbia polycarpa. No. 24860. Hayfields, west of Desert Center, California. September 16, 1929.

Euphorbia flagelliformis. No. 24861. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929. The pods of this species are evidently glutinous as they stick to the paper in drying..

Euphorbia chaetocalyx. No. 24863. Baboquivori mountains, Arizona. September 19, 1929.

Euphoribia dentata. No. 24864. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Euphorbia hirtula (?). No. 24865. Arrowhead Lake, California. August 4, 1929. Almost smooth.

Simmondsia Californica. No. 24866. Baboquivori mountains, Arizona. September 20, 1929. No. 24867. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Acalypha Neo-Mexicana. No. 24868. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Acalypha Lindheimeri. No. 24869. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Acalypha Virginica. No. 24870. Baboquivori mountains, Arizona. September 19, 1929.

Argythamnia Neo-Mexicana. No. 24871. East of Desert Center, California. September 16, 1929.

Croton corymbulosus. No. 24872. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Croton Neo-Mexicanus. No. 24873. Benson, Arizona, September 27, 1929.

Euphorbia, section of serpyllifolia, glyptosperma group are very unsatisfactory, the characters being based partly on the teeth of the leaves. The seeds are about the same in all. There is much variation in the pubescence. A character that seems valuable lies in the color of the leaves. This character seems to belong to stictospora and hirtula, and is lemon-yellow. But there are forms with this color that are perfectly smooth. There seems to be no other way than to put them all under serpyllifolia.

Euphorbia serpyllifolia (?). No. 24874. Quartzite, Arizona. September 16, 1929. No. 24875. Hayfields, west of Desert Center, California. September 16, 1929. No. 24876. Same locality. No. 24877 a form

(?). East of Blythe in Arizona. Seeptember 16, 1929. No. 24878. Same form. Quartzite, Arizona. September 16, 1929.

Euphorbia hirtula (?). No. 24879. East of Desert Center, California. September 16, 1929.

Euphorbia setiloba. No. 24880. Quartzite, Arizona. Seeptember 16, 1929.

Dalea angulata N. Sp. No. 24881. This would come in Rydberg's genus Thornbera. A woody perennial, herbaceous above, and with the habit of Parryella, with ascending stems two feet long and filiform and freely branching, ashy throughout with appressed white hairs, the calyx silvery. Leaves 1-2 inches long, on a petiole hardly longer than the lowest leaflet, with 6-10 pairs of oval-obovate and emarginate and thickish leaflets about 2 mm. long, which are smooth above and nearly contiguous, but ciliate on the margins and hairy on the back. Racemes 2-4 inches long on a slender petiole, with 10-20 ascending flowers appearing as if spicate at first, but with a minute pedicel which is glandular. Lanceolate bracts as long as calyx tube and deciduous. Calyx about 3 mm. long, almost deltoid in longitudinal section, with 10 conspicuous ribs and gland-bearing furrows between but with no exudate, the triangular calyx teeth about as long as the tube. Petals purple, about 1 mm. longer than the calyx. Growing among rocks at low elevations on the Baboquivori mountains, Arizona. September 22, 1929.

Astragalus oocarpus. No. 24882. Palomar mountain, California. July 13, 1929.

Astragalus Parishii. No. 24883. Arrowhead Lake, California. August 4, 1929.

Muhlenbergia Porteri. No. 24730. Baboquivori mountains, Arizona. September 19, 1929.

Muhlenbergia monticola. No. 24731. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Aristida divaricata. No. 24732. Ajo, Arizona. No. 24733. Baboquivori mountains, Arizona. September 19, 1929.

Aristida Scheideana. No. 24733. Baboquivori mountains, Arizona. September 19, 1929. No. 24734. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Chloris elegans. No. 24735. Ajo, Arizona. September 18, 1929. Acting like introduced.

Epicampes distichophylla. No. 24736. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. No. 24737. Baboquivori mountains. September 19, 1929. Common among rocks.

Eragrostis lugens. No. 24738. Baboquivori mountains, Arizona. September 19, 1929. No. 24738. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929. No. 24740. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Eragrostis pilosa. No. 24741. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Eragrostis megastachya. No. 24742. Sells, Arizona. September 18, 1929. No. 24743. Ajo, Arizona. September 18, 1929; No. 24744. Sentinel, Arizona. September 18, 1929.

Pappophorum apertum. No. 24745. Baboquivori mountains, Arizona. September 22, 1929.

Agrostis exarata. No. 24746. Arrowhead Lake, California. August 4, 1929.

Lycurus pheloïdes. No. 24747. Ramsey Canon, Huachuca mountains, Arizona. September 20, 1929. Var. brevifolius. No. 24748. Baboquivori mountains, Arizon. September 19, 1929.

Epicampens rigens. No. 24749. Baboquivori mountains, Arizona. September 24, 1929.

Koeleria cristata. No. 24750. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Arundo (?). No. 24751. Baboquivori mountains, Arizona. September 19, 1929.

Trachypogon Montufari. No. 24752. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Oryzopsis micrantha. No. 24753. Cushenbury Grade, California. August 17, 1929. No. 24754. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Hilari rigida. No. 24755. East of Desert Center, California. September 16, 1929.

Sieglingia pulchella. No. 24756. Sentinel, Arizona. September 18, 1929.

Yucca Schottii. No. 24757. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Yucca elata. No. 24758. Benson, Arizona. September 27, 1929. Common.

Yucca baccata. No. 24759. Wawona, Nevada. June 15, 1929.

Allium cernuum. No. 24760. Ramsey Canon, Huachuca mountains, Arizona. September 20, 1929.

Brodiaea pauciflora. No. 24761. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Lilium Fairchildii N. Sp. No. 24762. Palomar, California. July 13, 1929.

Camassia esculenta. No. 24763. Mono Lake, California. June 29, 1929.

Brodiaea grandiflora. No. 24764. Arrowhead Lake, California. August 4, 1929.

Habenaria Thurberi. No. 24765. Arrowhead Lake, California. August 4, 1929.

Iris Hartwegi. No. 24766. Arrowhead Lake, California. August 4, 1929.

Achyroanthes porphyrea. No. 24767. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Commelyna dianthifolia. No. 24768. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Dasylirion erumpens. No. 24769. Baboquivori mountains, Arizona. September 19, 1929.

Luzula comosa var. No. 24770. Bluff Lake, California. September 4, 1929.

Juncus tenuis. No. 24771. Arrowhead Lake, California. August 4, 1929.

Juncus bufonius. No. 24772. Arrow Head Lake, California. August 4, 1929.

Juncus xiphioides. No. 24773. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Eleocharis arenicola (?). No. 24774. Arrowhead Lake, California. August 4, 1929.

Carex cristata. No. 24775. Arrowhead Lake, California. August 4, 1929.

Carex rostrata. No. 24776. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Cyperus Schweinitzii (?). No. 24777. Baboquivori mountains, Arizona. September 22, 1929.

Cyperus Schweinitzii. No. 24778. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. No. 24779. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Puccinella aquatica. No. 24780. Bluff Lake, California. September 2, 1929.

Salix Bonplandiana. No. 24781. Baboquivori mountains, Arizona. September 23, 1929.

Salix taxifolia. No. 24782. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Salix fluviatillis. No. 24783. Baboquivori mountains, Arizona. September 23, 1929.

Quercus hypoleuca. No. 24784. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Quercus grisea. No. 24785. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Urtica gracilis. No. 24786. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Celtis occidentalis. No. 24787. Baboquivori mountains, Arizona. September 23, 1929.

Aristolochia Watsoni. No. 24788. Baboquivori mountains, Arizona. September 23, 1929.

Acalypha Lindheimeri. No. 24789. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Acalypha Neo-Mexicana. No. 23790. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Acalypha Virginica. No. 24791. Baboquivori mountains, Arizona. September 23, 1929. This species does not seem to have been reported in the region before.

Tragia nepetaefolia. No. 24792. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Tragia ramosa. No. 24793. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Allionia incarnata. No. 24794. Baboquivori mountains, Arizona. September 22, 1929.
Boerhaavia Caribaea. No. 24795. Ajo, Arizona, September 18, 1929.
Stevia Plummerae. No. 25065. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Eupatorium incarnatum. No. 25067. Baboquivori mountains, Arizona. September 19, 1929.
Eupatorium Arizonicum. No. 25068. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Gutierrezia linearifolia. No. 25069. Baboquivori mountains, Arizona. September 19, 1929.
Brickellia brachyphylla. No. 25071. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Solidago occidentalis. No. 25078. Bluff Lake, California. September 2, 1929.
Solidago nemoralis. No. 25079. Baboquivori mountains, Arizona. September 23, 1929.
Solidago decumbens. No. 25080. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Heterotheca subaxillaris. No. 25081. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Lessingia glandulifera. No. 25082. Baldwin Lake, California. August 17, 1929.
Bigelovia Douglasii var. No. 25083. Baldwin Lake, California. August 17, 1929.
Bigelovia nauseosa. No. 25084. Bear Lake, California. August 17, 1929.
Aplopappus gracillis. No. 25085. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Aplopappus Wrightii. No. 25086. Sentinel, Arizona. September 18, 1929. No. 25087. Baboquivori mountains, Arizona. September 24, 1929.
Aplopappus Cooperi. No. 25088. Baboquivori mountains, Arizona. September 22, 1929.
Erigeron Canadensis. No. 25089. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Erigeron Neo-Mexicanus. No. 25090. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Corethrogyne filaginifolia. No. 25091. Arrowhead Lake, California. August 4, 1929.
Aster adscendens. No. 25092. Arrowhead Lake, California. August 4, 1929. No. 25094. Benson, Arizona. September 27, 1929.
Aster tanacetifolius. No. 25093. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. No. 25095. Baldwin Lake, California. August 17, 1929.
Galinsoga parviflora var. semicalva Gr. No. 25094. Ramsey Canon, Huachuca mountains, Arizona. September 27, 1929.
Xanthocephalum Wrightii. No. 25095. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.

Eupatorium solidaginifolium. No. 25116. Baboquivori mountains, Arizona. September 23, 1929.
Brickellia venosa. No. 25101. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Brickellia reniformis. No. 25102. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Brickellia Wrightii. No. 25103. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Brickellia betonicaefolia. No. 25104. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Brickellia grandiflora. No. 25105. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Brickellia chenopodina (?). No. 25106. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Brickellia floribunda. No. 25107. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Brickellia Rusbyi. No. 25108. Baboquivori mountains, Arizona. September 19, 1929. No. 25109. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Brickellia axillaris. No. 25114. Baboquivori mountains, Arizona. September 25, 1929.
Senecio Hartwegi. No. 25115. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Heliopsis parvifolia. No. 25118. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Encelia frutescens. No. 25119. Castle Dome, Arizona. September 17, 1929. No. 25120. Quartzite, Arizona. September 17, 1929.
Encelia exarata (?). No. 25110. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Tithonia Thurberi (?). No. 25121. Baboquivori mountains, Arizona. September 23 1929.
Riddelia tagetina. No. 25097. Benson, Arizona. September 27, 1929.
Madia sativa. No. 25098. Arrowhead Lake, California. August 4, 1929.
Baileya pleniradiata. No. 25099. Sentinel, Arizona. September 18, 1929.
Verbesina longifolia. No. 25117. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Verbesina Wrightii. No. 25100. Benson, Arizona. September 27, 1929.
Viguieria cordifolia (?). No. 25111. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Gymnolomia multiflora. No. 25096. Baboquivori mountains, Arizona. September 19, 1929.
Gymnolomia multiflora var. annua. No. 25112. Benson, Arizona. September 27, 1929.
Carminatia tenuiflora. No. 25060. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Centaurea Americana. No. 25077. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Hymenatherum pentachaetum. No. 25028. Benson, Arizona. September 27, 1929.
Pectis angustifolia. No. 25029. Hayfields, west of Desert Center, California. September 16, 1929.
Heterospermum pinnatum. No. 25030. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Bidens Bigelovii. No. 25031. Baboquivori mountains, Arizona. September 23, 1929.
Palafoxia Hookeriana. No. 25032. Mohawk, Arizona. September 17, 1929.
Helenium Bigelovii. No. 25033. Bluff Lake, California. September 2, 1929.
Senecio MacDougali. No. 25034. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Hieracium Fendleri. No. 25035. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.
Perityle coronopifolia. No. 25036. Ramsey Canon, Huachuca mountains, Arizona. September 27, 1029.
Balsamorhiza deltoidea. No. 25037. Palomar, California. July 13, 1929.
Ximinesia encelioides. No. 25038. Baboquivori mountains, Arizona. September 24, 1929.
Trixis angustifolia. No. 25039. Baboquivori mountains, Arizona. September 20, 1929.
Hymenothryx Wislizeni. No. 25040. Ajo, Arizona. Seeptember 18, 1929.
Wrightii. No. 25063. Ramsey Canon, Huachuca mountains, Arizona. September 29, 1929.
Schkuhria Wrightii. No. 25041. Ramsey Canon. Huachuca mountains, Arizona. September 28, 1929.
Zinnia grandiflora. No. 25042. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.
Zinnia pumila. No. 25043. Baboquivori mountains, Arizona. September 25, 1929.
Parthenium incanum. No. 25070. Baboquivori mountains, Arizona. September 27, 1929.
Flaveria repanda. No. 25044. Benson, Arizona. September 27, 1929.
Melampodium hispidum. No. 25045. Ramsey Canon, Huachuca mountains. September 29, 1929.
Tagetes Lemmoni. No. 25046. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.
Bahia oppositifolia. No. 25047. Benson, Arizona. September 27, 1929.
Erigeron Philadelphicus. No. 25048. Ramsey Canon, Huachuca mountains, Arizona. September 27, 1929.
Ambrosia trifida. No. 25049. Benson, Arizona. September 27, 1929.
Ambrosia psilostachya. No. 24050. Sentinel, Arizona. September 18, 1929. No. 25072. Ajo, Arizona. September 18, 1929.
Antennaria arida. No. 25051. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Valeriana sorbifolia. No. 25052. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Cacalia decomposita. No. 25053. Ramsey Canon, Huachuca mountains, Arizona. September 27, 1929.

Stephanomeria exigua. No. 25054. Badwin Lake, California. August 17, 1929.

Stephanomeria ramosa. No. 25055. Pacheco Pass, Arizona. October 2, 1929.

Perezia nana. No. 25056. Below Miller Canon, Arizona, Huachuca mountains, Arizona. October 1, 1929.

Sonchus oleraceus l. No. 25057. Ramsey Canon, Huachuca mountains, Arizona. September 30, 1929.

Baccharis sergiloides. No. 25058. Baboquivori mountains, Arizona. September 25, 1929. No. 25059. Benson, Arizona. September 27, 1929.

Baccharis glutinosa. No. 25061. Baboquivori mountains, Arizona. September 23, 1929.

Baccharis Bigelowvii. No. 25073. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Porophyllum macrocephalum. No. 25062. Baboquivori mountains, Arizona. September 22, 1929.

Rudbeckia laciniata. No. 25064. Ramsey Canon, Huachuca mountains, Arizona. September 28, 1929.

Cirsium Mohavensis. No. 25066. Cushenbury Spring, California. August 17, 1929.

Artemisia ludoviciana. No. 25072. Miller Canon, Huachuca mountains, Arizona. October 1, 1929.

Franseria dumosa. No. 25074. East of Desert Center, California. September 16, 1929.

Psathyrotes annua. No. 25075. Sentinel, Arizona. September 18, 1929.

Tetradymia inermis. No. 25076. Baldwin Lake, California. August 17, 1929.

Canotia holacantha. No. 25122. West of Wickenburg, Arizona. October 4, 1929.

NEW SPECIES AND NOTES.

Amorpha ovalis N. Sp. No. 25027. Miller Canon, Huachuca mountains, Arizona. October 1, 1929. Plants with the habit and size of A. Californica and shrubby. Leaves many, bluish as if glaucous and appearing as if smooth but really with minute pick-shaped hairs. Leaves 3-4 inches long, narrow, with 6-8 pairs of oblanceolate, rounded and apiculate and mostly folded leaflets about an inch long. Racemes axillary, linear, about 4 inches long and on short peduncles, many-flowered, erect. Pods somewhat reflexed on capillary pedicles 2-3 mm. long. Pods ashy with minute pubescence, not glandular, oval, a little flattened, about 4 mm. long, triangular-apiculate with a stout style about their own length, 1-seeded. There is no evidence of glandularity in the leaves. Stems striate. Flowers absent.

Sisymbrium deflexum (Thelypodium lasiophyllum). In commenting on this species in Cont. 15 it might be worth mentioning that in nine cases out of ten it is impossible to tell how the notch in the stigma stands in relation to the septum, since there is no appreciable notch in most cases. But to hang its place in a genus on this alone, as has been done, and to ignore its manifest relationship to Sisymbrium in other respects, seems to me to be unscientific. In the Synoptical Flora Robinson did not hesitate to keep Thelypodium elegans in the genus in spite of the stigma lobes being parallel with the partition.

The Palms.

In my contributions No. 15 I indicated the infrequency of blooming of the species of Erythea and Washingtonia. Exceptions should be made, however. Erythea edulis is a copious bloomer, having bloomed continuously for seven years here in cultivation, and so has E. armata. Washingtonia filifera has never bloomed in the last seven years to amount to anything till last year, when it bloomed copiously all over southern California, and also fruited. This year, 1929, the same trees bloomed sparsely in Claremont but set little or no fruit.

Yucca Mohavensis.

This plant seldom blooms, but this spring the desert near Cabazon was ablaze with the bloom, but the plants set almost no fruit. This is in the San Gorgonio pass. Yucca Whipplei blooms copiously, but only once from

the same root except the var. caespitosa, and it never has a trunk. Y. Whipplei and elata both have long peduncles and erect and dry fruit, and elata also has a trunk. But Mohavensis, macrocarpa, baccata, Schottii and brevifolia have sessile panicle. The last two and the first have trunks only.

I do not think that much stress should be laid on the color of the leaves in the Mohavensis group, for we have growing in Claremont a tree of Y. Schotti with leaves just the shape, color, and length (3 feet) of Mohavensis but destitute of the marginal threads. No botanist would class the other tree Yucca (J. brevifolia) with this group with sessile panicles because of the thick petals and nauseating odor of the flowers, though the pods are erect and dry and in dense, ovate and sessile panicles.

Yucca marcrocarpa Eng. Bot. Gaz. 6 224 Wooten and Standley give as the proper citation Mex. Bound Torrey 221, but there is no such species described on that page. It should be 222, where the name occurs as a variety of Y. baccata. I do not think the name of Torrey should be considered at all for there is no adequate description of the species there, nor does Engelmann refer at all to Torrey's plant in his description of Y. macrocarpa. In addition to recognize Engelmann's type locality, Santa Rita mountains, Arizona, in canons, gives one an exact opinion of the species, while plains of western Texas near the Limpio is a very vague description, of the type locality. Then there is a great variation between the plains species and the canon species, and it is an open question whether they are the same. If we follow Trelease in his treatment of the Yuccas we must consider Engelmann's Y. macrocarpa the same as Y. Schottii, which name antedates his macrocarpa. This plant (Schottii) is common in the mountains of southern Arizona east of Tucson and does not seem to extend down to the plains. Schott evidently got his material mixed, and so a part of the description belongs to the var. macrocarpa of Torrey, but the macrocarpa of Engelmann is perfectly described and distinctive. The chief difference lies in the glaucous-green leaves of Schotti without any marginal fibers or very few and very fine ones, and a tomentose panicle, and excessively large fruit, which is fleshy, edible, and pendent.

Now what shall we do with the Yucca baccata var. macrocarpa of Torrey? Coville is the first one to erect this into a species, calling it Yucca marcrocarpa (Torr.) Coville. Ordinarily the previous (to Coville's name) publication of Engelmann's macrocarpa would invalidate any later species by the same name. But I think any varietal name should hold precedence over any other name proposed. This would invalidate Engelmann's name macrocarpa, and in this case it comes in quite handily. Then as to the name macrocarpa, Coville of course did not know what he was writing about when he published his macrocarpa, for he intended it to apply to the California plant which Sargent rightly called Mohavensis. But Coville's synonymy requires Torrey's type to be macrocarpa. Now the question is, "What was Torrey's type?" Torrey says the leaves are those of baccata, and the pods a little longer, and this is about all there is to the description, except that it is a small tree. Standley (Fl. N. M. 137) says by inference that the leaves are yellowish-green, but the crucial character he does not mention, namely, the fibers on the edges, whether they are fine or coarse,

which separates Mohavensis and baccata from the Schottii group. In my trip into Arizona in September I found a Yucca abounding on the plains east of Tucson, and out of flower or fruit which had leaves somewhat yellowish or glaucous, and with fine threads on the margins, and which I wondered if it could be a low elevation form of Schottii. This must be the real macrocarpa of Torrey. The leaves of this plant are distinctly shorter than Mohavensis, and much thinner and less rigid than that species. The thick and very rigid leaves of Mohavensis and baccata are very marked from any other Yucca. I am not in a position to say the last word on this species till I have made another trip through Arizona and New Mexico to Texas.

Yucca Schottii var. valida (Brandegee). Yucca valida Brandegee. I was in error in Contributions No. 15 p. 146 in referring this to australis, which is a species with pendent inflorescence, and which Trelease erects into the genus Samuela, and which does not grow on the Pacific slope apparently.

Yucca elata is a characteristic species of the Arizona plains, and is the eastern representative of Y. Whipplei (a plant without fleshy pods). This then takes care of all the usual Yuccas of Arizona except angustissima, and possibly glauca, both of which belong to the dry and erect pod section. Fleming says he has seen the true baccata south of the San Quentin Bay of Lower California. I am of the opinion that it goes over from the La Sal mountains, Utah, to Albuquerque and possibly farther southeast into Texas. Baccata does not grow anywhere west of the Providence mountains, California, and there it hybridizes with Mohavensis.

Canotia holacantha Torrey Pac. R. R. Rep. 4 68 and Bot Ives, also figured in Wheeler's Rep. 81 t I. Whether this and Holacantha Emoryi Gray can belong to the same family (as done by Robinson Syn. Fl. 379) the Simarubiacae is to my mind a big query. Wheeler put it in the Rutaceae. Holacantha is not well figured in the Mex. Bound 45 fig. 8. The ovary splits early into 5 carpels which are obliquely elliptical (Robinson calls them "ovoid") with sharp and triquetrous inner face and ridged along the suture, and either triquetrous or obvoid in cross section, and often with a sharp outer ridge, and nut-like, and very bony in texture, the whole very different in appearance from Canotia. But the plants of the two species have the same habit except that Canotia seems always to grow on ridges while Holacantha prefers dry washes, and I have never seen it growing on ridges. To look at, the plants seem identical at a distance, being green throughout to the main trunk, whose bark is brown like that of Quercus Gambelii. Both genera have the twigs erect and close-pressed to the main stem. Holacantha has its twigs rigid and very offensively spinose and sharp, making it difficult to get specimens of the flowers and fruit. But when you approach Canotia you find the twigs are very often without spines, and even when spinose the spines are short and the twigs flexible and rather soft. The fruits of the two genera are conspicuously different. Canotia has an elliptical fruit fully half an inch long (with round cross section) and ending in a long and fleshy beak. The outer part of the fruit is pulpy and soft and cuts easily, and when fully ripe splits into 10 subulate tipped sections, each suture splitting into two. The pods are erect and single. I found it grow-

ing rather abundantly a few miles west of Wickenburg, Arizona, on ridges along with Cercidium and Prosopis, and Cereus giganteus. The fruits of Holacantha are in dense panicles.

Astragalus Wootoni Sheldon. Minn. Bot. Stud. 9 138. I have always been much amused at Wooton's attempts to keep up his species. I have from him a part of his type labeled in his own handwriting, and the specimen is A. subcinereus, and accords with Sheldon's description where he speaks of it as perennial. It is likely that Wooton has distributed forms of A. playanus Jones as this species, but his type is A. subcinereus.

On page 367 of Wooton and Standley's Flora of New Mexico, in commenting on Astragalus Gilensis Greene, they state that my description of the species does not accord with Greene's and with specimens of theirs. As to that I do not know, but I have in my herbarium a part of Greene's type, from which my description is taken. Greene's descriptions were not always reliable, but there is no mistaking his type.

In his description of Astragalus oocalycis Jones Rydberg says that my figure of the type is faulty. This figure was drawn from the type in my herbarium, and therefore can hardly be faulty. I have always been inclined to think that A. oocalycis is a freak, after the fashion of A. grallator Watson, and A. hyalinus Jones. So far no one knows whether it is or not. But insects do make distortions now and then that are evidently freaks. I do not know if A. hyalinus is a freak of A. triphyllus, but I do know that A. grallator is a freak of A. Haydenianus, and oocalycis is liable to be a freak of A. racemorus.

Astragalus. In the recent issues of the North American flora of Britton Rydberg has his last say on this genus. I confess to a general state of confusion of mind in trying to get order out of this chaos. Rydberg seems to have a perennial peeve at any species of Astragalus I have ever described, and he does not hesitate to put them into synonymy wherever possible, doing great injustice to his reputation for consistency, if he has any. To me it is no matter who has published a species, the simple question is "Is it Good?" I do not see any sense in holding a grudge against those who do not agree with me. They have as much right to their opinions as I have to mine. The only question is as to the soundness of their judgment in each particular case. The psychological element enters into the work of every man, and we find that the very best of all our botanists have blundered continually. The man who does not blunder does not exist. So why should we feel a personal affront when a person shows up our mistakes. In Contributions No. 13 p 27 I make the fatal mistake of roasting the work of the person who wrote the Cyperaceae for the new Gray's Manual. I did not know at that time who wrote it (and I did not care), and I do not now. It was a poor piece of work. It turns out that Fernald wrote it, and so I earned his everlasting enmity for daring to criticise it. Well, he has been lying for me ever since, and at last he found a small defect in a key of mine, and reversing the old Latin adage of "montes partruient, nascitur ridiculus mus, he makes a mons out of a mus, and he is welcome to it. But to me it is babyish. Rydberg has put himself in an impossible position by assuming that no genus should have more than half a dozen species. Whether this is the cause of his

innumerable spurious genera or not I cannot say, but there are no scientific grounds for them. If there is a real difference between groups then there is some grounds for the erection of a generic name to mark it, but Gray's way of making sections is far better in my opinion.

Now taking up the genus Astragalus in order we find him splitting it into 20 different genera. Now do these proposed genera contain well-marked groups that would lead the average botanist to recognize each group from the species included in it? Let us see. Another question is are the genera grouped in the genetic order? His first genus is Kentrophyta of Nuttall, which is perfectly manifestly a specialization of the "Homalobi" due to altitude of habitat, and for that reason should follow and not precede the Homalobi. The one good species in this group he expands to ten, raising my different varieties to specify rank and omitting, humilimus and sesquiflorus. Any acute botanist in the field will find all of his supposed species confluent. His next genus is Homalobus of Nuttall. The first six proposed species contain at least two and possibly three good species, and this group of six species comes next in the genetic order to Kentrophyta but before it and not after it. Then he brings in (and out of order) Astragalus tenellus, which he splits into six species. This species is manifestly higher in the order of development than Astragalus decumbens (which he puts in a different group and calls it Bougoviani), for the reason that the leaves are more specialized and the stipules connate. I take decumbens to be the most primitive of the Astragali, being nearest to Lotus (Hosackia).

I do not consider it worth while to again go through Rydberg's work and point out every mistake. I do not know a single competent botanist who accepts Rydberg's conception of species and genera. Now that E. D. Merrill is to be at the head of the Botanical Garden at the Bronx we are liable to see a shaking of the dry bones there.

Cogswellia Cottami N. sp. Allied to C. Parryi. Caespitose and densely tufted and acaulestent and stout, a foot high with stout and erect peduncles. Leaf bases large and sheathing and fibrous. Leaves about as long as peduncles, glaucous, rigid, broadly linear, with petiole 1/3 the whole, bipinnate to tripinnate, about 2 inches wide, pinnae rather distant, partly bipinnate, with final divisions linear, acerose and strongly 3-nerved, 4-8 mm. long and decurrent on the rachis. Rays stout, 6-8, about 1-2 inches long and spreading and without involucral bracts. Involucels with 6-10 pedicels, half of them aborting, and in fruit about 8 mm. long, with an equal number of bractllets half as long as the pedicels. Flowers not seen. Fruit elliptical, about 8 mm. long by 4 mm. wide, with the wings fully as wide to twice as wide as the body. Oil tubes 3 in the intervals and 6 on the commissure, large and uniting, fruit nearly truncate at both ends. This may be an extreme form of C. Parryi with fruit twice as large and leaflets linear. Dry hillsides at the Apex mine, on hillsides in the Beaverdam mountains, Utah. June 4, 1929, Cottam, Stanton and Harrison. This species seems to have been collected by Munz, Johnston and Harwood in the Providence mountains, Nevada, also, previously.

Venegasia carpesioides Gray. Supplementary to my remarks in Contri-

lutions No. 15, it should be stated that this is a shrub, 4-6 feet high, with a distinct woody trunk an inch in diameter, with smooth bark, having the habit of the shrubby Encelias of the Cape region of Lower California.

Arenaria aberrans N. Sp. Plants densely caespitose and woody, about 6 inches high and simple and erect from very short and decumbent bases. Leaves densely clustered and rapidly reduced above to hyaline bracts with green midveins above, arcuate, triquetrous, needle-tipped, an inch long, hispidulous below but appearing glaucous, filiform and white margined, from a much widened and hyaline base, upper bracts shorter than the calyx. Stems glandular above the middle as are the pedicels. Inflorescence open, a simple or compound cyme, 3-7 flowered. Flowers white, about 7 mm. long and about as wide. Sepals oval-ovate, 4 mm. long, green and shining in the middle and obscurely 9-nerved for 1/3 the width, the rest hyaline, barely acute when fresh, appressed. Petals elliptical and 7 mm. long and a little longer than the stamens with oval and purple anthers. Capsules conspicuously inflated, deltoid in outline, green, twice as long as the sepals, splitting into 5 lobes at tip and which are purple within. Box Elder County, Utah. Cottam No. 4159.

In June, 1929, I visited El Tobar on the southern side of the Grand Canon and saw the stately monument erected to Major Powell and the band of Government men who accompanied him down the Colorado river in 1871, on that blood curdling trip. The secrecy that has always surrounded that trip and his work surveying the Grand Canon has always been a puzzle to me. Forty years ago or more I made the acquaintance of one of his party, the topographer, Captain F. M. Bishop of Salt Lake City, and he was a fellow townsman for many years till my removal to California. His herbarium made on that expedition has always been in my own collection, all the types not now at Harvard.

On the visit referred to I failed to see his name among the list of those who traversed the Grand Canon, and for this reason I hunted him up, now a very old man, at Salt Lake, and conferred with him about the matter. During the conversation his daughter showed me a transcript of his diary, fragmentary but complete as far as it went, which throws a flood of light on the expedition, and its asinine management. I borrowed the M.S. and have copied it, and some day, may possibly publish it. Captain Bishop was one of the very few educated men in the party, and was the center of the botanical activity, making the best collection, but Mrs. Thompson, the sister of Major Powell, sent her collections to Harvard independently. Captain Bishop was later on the Professor of Botany at the State University in Salt Lake City.

The announcement of the election of E. D. Merrill to the head of the New York Botanical Garden comes as a great surprise to American botanists. It seems to mean the permanent passing of the most disturbing factor in American botany, and we hope the end of personal botany. Californian botanists cannot afford to lose Mr. Merrill, who has endeared himself to all, but the Botanic Garden will be very fortunate if it can secure his services.

List of Herbaria where Types are located. (Panicum.)

Biltmore Herbarium N. C. Chapman's types.
Gray Herbarium. Gray and Watson's types.
Field Museum, Chicago.
New York Botanical Garden, at the Bronx. Herbarium of Columbia University. Torrey Herbarium. Nash Herbarium.
Philadelphia Academy of Science. Nuttall's plans, Buckley's plants, Muhlenberg's plants, Short's plants.
St. Louis Botanic Garden. Engelmann's, Bernhardi's herbarium.
Washington National Herbarium.
Charleston Museum has the Elliott herbarium. North Carolina.
Parry Herbarium is at Ames, Iowa.
Gattinger Herbarium is at Knoxville, Tennessee.
Ashe Herbarium is in the Forest Service Herbarium at Washington.
Lamson Scribner is in the Department of Agriculture at Washington.
Morr Herbarium is in the National Herbarium.
Rafinesque and Wood Herbaria not located.
Jones Herbarium is at Pomona College, California.

European

Antwerp. Herbarium of Van Huerck contains Salzmann's plants (Brazil).
Attersee. Has the herbarium of Hackel.
Berlin contains the Willdenow herbarium at Dahlem-Steglitz.
Brussels contains Fournier's plants, and specially Galeotti's plants.
Copenhagen. Botanic Garden contains Liebmann's plants.
Florence, Italy Herbarium. Orto Botanico has types of Poiret in the Desfontaine's Herbarium. Also types of Desvaux, Lamarck, and Bosc's plants.
Geneva, Switzerland. The Conserv. Bot. has the Delessert Herbarium.
The DeCandolle Herbarium.
William Barbey and Boissier herbaria are at Chambesy, near by.
Goettingen. Contains the Grisebach herbarium at the Botanic Garden.
Halle.
London Kew contains the Pursh collection.
British Museum contains Gronovius's collection, also material from Radde, Rudge, etc. Also the Sloane herb. with Walter's plants.
The Linnaean Herbarium contains Linnaeus's plans.
Madrid Jardin Bot. contains types of Cavalille and Lagasca.
Munich Konigl. Bot. Mus. contains Martius's plants of Brazil described by Ness and Doell. Also duplicates of Swartz and Lagasca.
Paduo Orto Botanico has plants of Bosc.

Paris Mus. Nat. Jardin des Plantes has types of Bonpland, Desvaux, Fournier, Richard, and Steudel. Also at Paris is the Michaux herb., the Jussieux herb. and Lamarck herb. The Cosson Herb. contains the Poirer types. The Museum has now the Franqueville herb., where are types of Michaux and Richard and Schaffner's plants.

Prague has Haenke's plants.

St. Petersburg. The Herb. of the Botanic Garden has Karwinsy's plants, F. Mueller's and some of Fournier's plants. At the Academy Imp. are Trinius's plants.

Stockholm has types of Fries and Lindman, and Swartz plants.

Vienna has an important herbarium. This has the Hackel Herb. at Battersee.

Salix in southern California. The earliest willow which blooms in this region is Salix lasiolepis. It was in bloom January 1st and still is blooming (February). It is the most common willow, and is evidently related to S. cordata, having the two stamens, black-tipped scales and smooth pods, and catkins without leafy bracts, coming out before the leaves. Bebb in the Flora of California makes a variety out of a form said to have leafy bracts, but this variety is probably a form of laevigata, which grows with lasiolepis, but does not bloom till a month later. The stems of lasiolepis, if left to a state of nature, would become trunks 40 to 50 feet high and two to three feet in diameter, appearing like the other black willows, but most of the southern Californian plants are shrubs, some 15 to 20 feet high, with many trunks which are straight and erect, smooth, and greenish-gray, and a few inches thick, and branching racemosely above. The plants are inclined to be deciduous, but leaves often hang on all winter. The leaves are whitish below and green above.

Salix laevigata grows more sparingly along with lasiolepis and is more inclined to be a tree and more like an evergreen. The male trees sometimes have red twigs, but otherwise like lasiolepis. The catkins of lasiolepis are always linear and elongated. Those of laevigata (the male ones) are broader and inclined to taper at the ends, and have more than 2 stamens to a scale, which places the species among the black willows. Then the fertile catkins are very slender and leafy-peduncled, and with long pedicels to the fruit. The leaves are waxy-glossy-green above, and the trees bloom a month later than lasiolepis but before the black willows. The leaves of lasiolepis are inclined to be wider above, as in cordata, and are thinner. All the black willows have the tapering tips to the leaves and are inclined to be conspicuously serrate. The black willows are laevigata, nigra, amygdaloides, Bonplandiana and lasiandra.

I suppose that the name of "black" willow arose from the fact that the charcoal used in black powder came from them.

Lilium Fairchildi n. sp. Two years ago I took with my friend, Dr. Fairchild, a trip to the Palomar, a high and short range west of Warner's Hot Springs, in search of lilies and Calochortus. This range goes up into the Middle Temperate and is clothed thickly with Pinus ponderosa, Abies

macrocarpa and Quercus Kelloggii, and whose slopes are covered with the black loam of ages of decaying vegetation. At the hotel we saw a single specimen in a bouquet of a lily of striking peculiarities. The lady at the hotel told me they grew in the meadows. We searched diligently for any lilies in the meadows and found none, and went home disappointed. The doctor has always insisted that the lily is a new one. I have also been sceptical about it, but because of the knowledge of my friend I felt compelled to settle the matter one way or the other. So on a special trip to the mountain in July, 1929, I determined to get it. Arriving at the hotel I fortunately met Mr. Rausch, the one man who knew all about the lily. He informed me that it grew in the pine woods in deep shade, which was a revelation to me, and which would seem to place the lily in the Humboldtii class. He said it was common in the spring but that the cattle ate it off, but he had many growing on his place and in bloom. So over we posted and saw at least 50 of them in bloom. He kindly let me get two plants in bloom for herbarium specimens, and gave me three bulbs, which are now growing. I suppose all the lilies are really grown from root stocks or rhizomes, but in Humboldtii the rhizome is reduced to a mere rudiment if it exists at all, for the roots come out from the center of the base, and the so-called bulb is not oblique, and is made up of several thick and rounded scapes closely aggregated, which are crimped or septate near the base and about an inch long, and the leaves are whorled. In Lilium Parryi there is a true rhizome 2 to 4 inches long covered with short and ovate bulb-like scales, which like the other is buried deeply in the ground, but the habitat is different, being wet meadows, while that of Humboldtii is shady woods, in black muck. The bulbs of Lilum Fairchildi are decidedly oblique, and therefore a reduced rhizome, but forming an ovate or oval bulb or cluster of very many flattened and scale-like flakes, hardly an inch long and crimped in the middle. Otherwise the plants resemble Humboldtii so closely as to be taken for that species except that the spots on the petals are black and without margins. The petals are coiled so as to form a circle and are orange in color, and linear and acuminate at tip, and about 4 inches long. The buds are acuminate and yellowish. The petals are without pubescence or raised processes. The plants are 4-6 feet high and erect and shining, single, with pyramidal inflorescence (in appearance, though really racemose), rarely more than 3-flowered. The leaves are about 12 in a whorl, and smooth and shining, and 4-6 inches long. I take it as pleasure to name this fine lily after its real discoverer, Dr. J. H. Fairchild, of Claremont.

Allium Palmeri Watson. The type of this species is from New Mexico. It seems to have been collected but seldom. I have it now from the Kaibab growing among the junipers on the western slope. That Watson was right in placing it near to bisceptrum is evident. Johnston has collected the species at Granite Well, near Randsburg, California. The species arrests one's attention by its deep pink or purple flowers, at once suggesting A. acuminatum. It has the same tendency for the flowers to have dark midribs and to be lighter below the tip and with acuminate petals. Watson describes the plants as about 8 inches high. I seldom find them over 6 inches high,

with the bulbs two inches of this underground. The leaves are at least ¼ inch wide and thin but concave as in bisceptrum, but hardly half as wide as that species. In drying they seem filiform but they are not. The crests are not rightly drawn in Watson's figure. They are double and flaring. The bulbs are globose-ovate and strongly apiculate, and from the base send out long and filiform underground stems or runners ending in bulblets. The bulbs are white as in bisceptrum and ½ to ¾ inch wide. The outer coat is a dirty light-brown and strongly reticulated with the lateral lines either straight or slightly crinkled, and the vertical lines double krinkled, the meshes being approximately rectangular. Beneath the strong coat of the bulb comes a thin one or two with obscure rectangular markings, and then a forming reticulated coat. The outer bulb coats peel off easily and leave the white bulbs exposed. The plants grow either exposed or in the shade of the junipers. The bulbs do not have innumerable coats as most bulbs do, but are few.

The bulbs of A. bisceptrum produce many bulblets around the base of the mother bulb and seldom have any long rootlets (underground stems) with bulbs on the ends, but each bulblet is attached to the mother by a thread. The figure in King's report, that is the whole plant figured there, is the var. Diehlii and not a part of the real type from the Sierras. The var. Dielhlii is manifestly the parent species and the Sierra form an offshoot from it. But as Watson makes the Sierra form the type of his species we have to put Diehlii as a variety. It is a question whether we should put Palmeri as an extreme form of bisceptrum, which it really is, genetically.

Allium acuminatum. Prof. Cottam of Provo, Utah, sends me this species from Mt. Delenbaugh on the rim of the Grand Canon.

Allium Palmeri. I found this species growing abundantly on the western slopes of the Kaibab among the junipers and pinions. It has the same flat leaves of bisceptrum and evidently is closely related to it. The crests on the ovary were conspicuous and double: the flowers a brilliant purple. Plants about 6 inches high.

Echinocactus Sileri Eng. in Cont. Nat. Herb. 3 376 1896. The fact that Engelmann never published this species is evidence that he doubted its specific character. Britton and Rose, however, with no information about the plant but the specimen in the Missouri Botanic Garden, go to work and make a new genus of it, calling it Utahia because they thought it was gathered in Utah, but Pipe Spring, the real type locality, is in Arizona. From the figure in their Cactaceae there is nothing to separate the species from Echinocactus Simpsoni, but they say the flowers are yellowish. The only sensible way would have been to have ignored the species till they had some definite information about it. But their method was to erect a genus on every little technical difference, the Rydbergian style. I have visited the type locality twice and have hunted for the species but never yet found any trace of it, and so has my friend Ben Johnson of Salt Lake City, an enthusiastic grower of native plants.

Sophora stenophylla Gray. This plant in 1894 was common on the grade going up from St. George, Utah, to Diamond valley. In recent years it has been common along the highway between St. George and the Indian

agency on the Santa Clara. Last year it had disappeared from this locality. This year it grows by the acre on the drifting sands on the hill above Toquerville, Utah, 25 miles east of St. George. I also found it thriving in Canon Diablo, Arizona, near the meteoric crater. This extends its southern range about 200 miles. The type locality is the Moqui region, Arizona. It also grows at Moab, Utah.

Dendromecon Piercei Jones is Hunnemannia fumariaefolia Sweet from Oaxaca, Mexico. To my mind the characters on which this genus depends are not good, and it must be relegated to Dendromecon as D. fumariaefolia (Sweet).

Astragalus Wingatanus Watson. Rydberg has called attention to my error in my monograph on Astragalus in writing this name as Wingatensis. The facts are that it is a straight error of mine, but brought about by assuming that Watson, whose knowledge of Latin was sufficient, would write his Latin names correctly. The contex where he described this species will show that he intended the name to perpetuate the name of Camp Wingate, New Mexico, and not Captain Wingate, for whom the town was named. This would require the name to be Wingatensis, just as I had written it. It is not, however, a matter of much consequence.

Further notes on Echinospermum subdecumbens Parry. On a recent trip through northern Nevada, I saw from Wendover west to Wadsworth many plants, and every one I saw had either white or dirty white flowers. I think pale flowers are the rule and blue ones the exception.

Vergin river. In 1894 I tried in vain to get Coville to adopt the proper spelling of this river and region. The name did not arise from the Latin word "virgin" at all but from the name of a man, Vergin, who lived in the region in the sixties.

CORRECTION TO CONTRIBUTIONS NO. 15.

In the hurry to get this off the press, a few serious errors crept in. On page 94, beginning with "Lies on a mesa" to the end of the page should be at the top of the page.

On page 124 the last two lines of the paragraph on Drymaria crassifolia should follow Callitriche.

Under Callitriche Mexicana the two lines under Drymaria crassifolia are out of place and should immediately precede D. Tepicana.

Add to Mimosa aspera. No. 22995. La Barrance. February 21, 1927.

In studying the Flora of Lower California and adjacent mainland one is struck with the amazing mixup of species. One would suppose that the Bailey Willis theory of age and area would have some application in such a wide country. Merrill has shown that the Philippines have a large number of Mexican immigrants brought there in recent years by ships, doubtless. Now we are continually finding species accredited to Oaxaca and Mexico and Vera Cruz scattered throughout Sonora, Sinaloa and Tepic (Nayarit).

They surely must be immigrants, brought in along the trails by Mexican travelers, but the reason why they persist is that they all belong to the same life zone, the Tropical, which prevails throughout to the very northern limits. We find the papaya growing as luxuriously at San Jose del Cabo as in Oaxaca. We find the cocoanut growing all along the coasts. We find the devil grass as abundant in one region as another, and as much of a curse. For this reason in attempting to identify plants we have to comb the entire republic before we are sure our plants are new. The flora of the republic is the most extensive in North America. To me the theory of Willis has been known, and was known to botanists long before he was born, but never made much of because each species of plant and animal reacts differently to its environment according to its inherent vitality, its adaptability, and means of transportation. The scattering occurrence of many species is evidently a matter of accidental transportation. The localization of other species is an evidence of their recent creation. There are more of these in Mexico than any other region that I know, and on genetic grounds it is to be expected. There is no evidence of forced migration (glacial agencies) as is the case in the United States and Canada. On the other hand human agencies hav been active for half a millenium, but only by the transportation of animals, and not machines, as now.

CRITICISM.

In a recent issue of the American Botanist, the editor in commenting on my Contributions No. 15 says, as he turns its pages, he fears what may come next. I am sorry that he has a guilty conscience. However he need not fear, for I don't know anything about his magazine, but I do know that most editors are cowardly pussyfoots, and there is no animal that I despise more than a coward.

BOTANISTS WHOM I HAVE KNOWN.

C. G. Pringle. My acquaintance with Pringle began by correspondence in the early eighties or late seventies, in a series of exchanges of botanical specimens. Pringle impressed me as a painstaking botanist from the first, and one specially acquainted with the ferns. His specimens always were very fine. I remember getting material of Astragalus Robbinsii from Smuggler's Notch (the type locality) from him. He was also well versed in Carex. In those days very few botanists bothered with Carex or the grasses. After each year's work in the west he would write me asking for more material, and he always had enough to exchange, winding up with a lot of ferns from the Hawaiian islands. Along toward the last he wrote me asking what I thought of his coming west and botanizing in Mexico. My reply was that he better keep out. Then in the spring of 1882 I was at San Diego and Parry told me that he had just arrived, and he suggested that we form a party and go to Ensenada together, which we did. On that trip I saw much

of him. He was then about 40 years old, some 10 years older than I. We had many pleasant visits around the camp fire on the trip. He told me he was of Quaker stock, was married and had separated from his wife because of inability to get along with her, and that this was the reason for his trips west. He was a very mild spoken man, with positive opinions which he never tried to impress on others. He was a very quiet man also. He had a young man along with him as helper, and had his own outfit for traveling, that is a team and wagon and horses. The first thing I noted was his antipathy to poor specimens of plants. He never would collect a specimen unless it was just right. We camped together but each party had his own outfit and got their own meals. Parry and I had Charley Orcutt as teamster and cook, a lazy boy of 19 years who knew a little more about everything than the Almighty.

In later years Pringle specialized on west-Mexican botany and discovered many new species of plants.

Pringle impressed me as a very conscientious man, absolutely on the square about everything. I have known men who knew him in Mexico, and at whose places he stayed while botanizing in those regions. He usually sought out the ministers (missionaries) of the regions, and stayed with them.

ASA GRAY.

It is not my intention to give a comprehensive review of Gray's work, but rather my impressions of him as shown by correspondence through some twenty years.

When in the early seventies I found it impossible to identify plants by the books, I wrote to Parry, who was the only botanist I knew of in Iowa, to name certain plants for me. I had never met Parry, but he was a self-advertiser who kept his name before the public as much as possible. Parry was not able to name my plants for me but suggested that I send certain ones to Gray, and certain others to Engelmann. In due time I got a report from Engelmann, who suggested that I consult William Boott for the Carices. Gray replied after a while, and informed me that Watson would report on the plants not named in Gray's report. Thus began my acquaintance with Gray and Watson, neither of whom I ever saw personally.

Gray always wrote in his chicken-track scrawl, which was almost as bad as my own. Engelmann almost always wrote on postal cards in an impossible scrawl, which consisted of a few wiggles at the beginning of a word and then tapered off to a line at the end. The only way it could be read was to take a run at it, a kind of hop-skip-and-jump, and then if you did not get it right you had to start over and guess again. Watson's writing was always legible.

When I began my systematic examination of the flora of Colorado in 1878 I had many plants to identify, and I divided them up among the three men. Engelmann always reported first, then Gray, and last Watson. Gray's reports were always to the point, and gave the latest information. He was always courteous. Once he made fun of me for naming Chenopodium

botrys Urtica urens. As the years rolled by, and the calls on his time became greater, and the infirmities of age became burdensome, his responses were slower and at times quite annoying, because I had to name and distribute my sets before it came time to go out in the field again. In one of these letters I received from him he complained of the burden of years affecting his memory, and saying that he could not finish for some time. This was about December 1st. The day before Christmas I received a fat letter with all the names, and he wound up by saying that this was a Christmas present from him. I never received even a querulous letter from him at any time.

Since I was giving my entire time to a study of the flora of the West, I rapidly became proficient and needed less and less help in identifying. This also led me to see that the judgment of both Gray and Watson was at fault in certain cases, for they did not know the ecological conditions under which my plants grew. In the genus Arabis I found Watson's determinations unsatisfactory, and it reached such a point that I informed him that I would publish my own names for certain species of Arabis unless he agreed to respect my manuscript names for them when he made his revision. He never replied to this but he respected my name, Arabis pulchra, that I gave to a certain species from western Nevada, and he made several new names for plants that I had collected and which I felt were new. This is the nearest I ever came to any friction with either of these men.

I began early to publish notes in the Botanical Gazette and Torrey Bulletin, and in the early eighties I sent an occasional new species. It was at this time that Greene also began to publish new species in those magazines.

Gray was waging a bitter struggle with death to finish his great synoptical flora before the end, and he felt that the publication of our new species was unjustifiable till he had had his say. I know this not from any word from him to me but from his writing to Coulter and Gerard, editors of the Gazette and Bulletin, demanding that they do not publish any of our new species till they had his approval. I know also that it annoyed him, for his comment on my description of Iva Nevadensis (Synoptical Flora), where he goes out of his way to criticise my description of the akenes as being striate, when he says they are not striate. Of course anyone who will examine the mature akens will find that they are striate just as I described them. In his criticism of Buckley, Gray showed the same unfairness, and lack of discrimination. In other words, when he was angry he became unreliable. For some ten years I did not offer much for publication till after the death of both Gray and Watson. Then when Zoe began I also began to publish my views on new species. Greene, as everybody knows, became rabid in his hostility to Gray.

My opinion of Gray is that in quantity of product he was the greatest botanist in America, but in quality of work he was inferior to Engelmann. He made some egregious mistakes, as we all do. For example, he described my specimens of Convolvulus pentapetaloides as Breweria minima. He made the genus Hemizonella out of species of Melampodium.

Elihu Hall. He was, as I suppose, the Hall of Hall and Harbour, who collected the first sets of Colorado plants. I never met him but got in cor-

respondence with him in the late seventies, and he sent me a set of his Texas plants. He was much interested in mosses and was very anxious I should get him many mosses, in my various expeditions. His name often appears in the description of mosses by Ausin. He was an indefatigable collector.

Harry N. Patterson. He lived at Oquawka, Illinois, and was the son of the Patterson who owned the Rocky Mountain News. Harry was a printer by profession and got out a check list of North American plants; he also printed my first labels. He was much interested in Colorado botany and made some collections around Gray's peak.

PARISH.

Since the MS. of my last Contributions was written, another and next to the last of the old guard has slipped away into the unknown. S. B. Parish was a polished gentleman of the old school. If he ever had an enemy no one ever knew it. I never knew him to write but one caustic comment, and that was on the disreputable C. R. Orcutt, who also has passed away in Mexico recently. His name is intimately connected with the botany of southern California. He owned a ranch when I first met him in San Bernardino, and he used to take many trips out on the desert in all directions, and he discovered many new species of plants. He was a valued correspondent of mine for many years, which correspondence continued till his death. One of his last letters said that "the hill became steeper and longer" every day between his home and the herbarium at Berkeley, for he died of old age. A great calamity befell him in the Berkeley fire a few years ago, when his home was burned, and with it all his botanical notes and a complete MS. of a book on the flora of southern California. Parish and Mrs. Brandegee were the two most competent to write on the Flora of California, and both died without leaving anything to remain as a permanent monument of their life work.

A. L. SILER.

During the survey of the Grand Canon by the Government, Major Powell who was at the head of the survey, had his headquarters at Kanab, Utah. His sister, Mrs. Thompson, was an amateur botanist who collected quite a number of native plants and sent them to Dr. Gray for naming, among them being a few new species of plants. The gossip among the natives magnified her work into grotesque proportions, as all new things do. Living at Kanab was an old farmer who became interested, and who figured that he might make some money out of collecting native plants and sending them east and to Europe. He was Siler, a kindly and ignorant old man, a Mormon and a polygamist. He was about seven feet tall, and as slim as a rail, and wore about a No. 14 shoe. He was awkward and uncouth, but a real man. He had a ranch up on the plateau among the pinons and junipers at a place called Ranch, where I visited him in 1890. He specialized on cactus, and sent his stuff to Engelmann for naming. He explored the steep slopes of the Grand Canon and got many interesting species. At Pipe Spring,

Arizona, twenty miles to the west and on Cottonwood Creek, north of there, he found a cactus which Engelmann named Echinocactus Sileri. Apparently but one specimen of it is extant and that a dried plant in the herbarium of the Missouri Botanic Garden, got apparently at the spring. It was a query to Engelmann what it really was, and he never published it, but Britton and Rose had the temerity to do so and they made a new genus of it and called it Utahia, because they thought it was got in Utah. Their Latin was poor, for the Romans would have called it Utavia. I have made two visits to Pipe Spring to get this plant btu never saw it. Siler had a large family and one of his girls married one of the local boys. This fellow turned out to be a scamp, and once made a remark about his wife that threw discredit on her. So one of Siler's sons took it up and promptly shot his brother-in-law. This resulted in his being sent to the penitentiary at Salt Lake City. His father appealed to me to try to get him out. So I put the facts before the Governor and the young man was released. However the incident left bad blood between the families, and finally the father of the man whom he shot killed him. This rough and ready way of settling feuds gets results if nothing else. It is not to be assumed from this that the Mormons were dangerous people, for I traveled among them for many years without ever having any trouble.

J. E. Johnson, a much higher grade man than Siler, also collected many plants and discovered a number of new species. His headquarters were St. George, where he had a drug store. He also was a Mormon and a polygamist. I never met him, though he was still alive when I was in St. George first.

Another of those early botanists was John Reading, who kept a greenhouse in Salt Lake City for many years. He was a very fine gentleman, whom I knew for many years. He got a Sedum which was named after Meehan. He also was a Mormon and a polygamist.

WATSON.

Sereno Watson. My acquaintance with Watson was the same as that of Gray, and it is likely that my characterization of him will be defective, but I had a better chance to learn of his capacity than any contemporary botanist for the reason that I worked over the same field. We know little about his early training except tthat he was a college graduate. In the sixties he was a tutor in Iowa (now Grinnell) college and was given the degree of Master of Arts by that college. The next we hear about him is when he walked barefoot into the camp of the U. S. geological survey and applied for the job of botanist to the expedition. This was the survey of the fortieth parallel under Clarence King, and the camp was in western Nevada. W. W. Bailey was the botanist of the expedition and was incapacitated by ill health, Watson coming in at the critical time, and without any recommendations, to replace him. Once in the early years someone asked Torrey where Watson

came from. Torrey pointed to the sky and said nothing. This seemed to be the universal opinion of him at Harvard. I should judge that he was a tall man, dignified and self-contained and formal. His letters to me, which were many, were business-like and to the point and colorless. There never was the slightest degree of friendliness or the opposite in any of them. There was not the companionableness of Gray in any of them.

I went minutely through his greatest work, the botany of the 40th parallel, and I found it the best ever published on American botany. It should be remembered that this was the first attempt to write an ecological botany of any region in this country. Though the subject of life zones was not known in those days, Watson's resume gave all the details necessary for such a study. In his Death Valley report Coville made a clumsy attempt to copy this work, and without any sign of a recognition of where he got his information. I do not know the official title of Watson at Harvard, but he was in fact an understudy of Gray through many years. His name will always be mentioned in his three great works, the 40th parallel, the Bibliographical Index, and the Botany of California. Watson seems to have done most of the work on the Synoptical Flora outside of the Gamopetalae. Much of his time was taken up by describing and identifying the collections made in the west and in Mexico by various collectors, at a time when the most activity was on in botanical exploration. From time to time he got out synopses of genera and families. He died before his work was complete, died in the harness. In quantity of work he was inferior only to Gray. His judgment was mostly sound on generic and specific limitations. His greatest defect was a penchant for short descriptions.

I began this article on botanists whom I have known, more as reminiscences of the dead, but it has become somewhat comprehensive, and puts me in the position of omitting important names. Cusick was one of our best collectors. He was a most lovable man, a school teacher at Union, Oregon, where his idolized wife died and broke his heart and caused his early death. Then there was Joseph Howell of Portland, Oregon, a great collector who worked under much difficulty and got out his flora with the help of his admirable wife. Then there was Lemmon of Oakland, California, an old soldier of the Rebellion and an invalid. His name is the most mentioned of any in the botany of California. He was suspicious of all other botanists and hard to do anything with. Then there was Dr. C. L. Anderson of Santa Cruz, who had moved from Carson City, Nevada, whose name is often mentioned by Watson. There were Mrs. Austin and Mrs. Ames of the Sierras, who did considerable collecting. The most noted botanist of them all was the genial Dr. Albert Kellogg of San Francisco, who, with Dr. Harkness and Dr. Behr, were the argonauts who helped to found the Academy of Science. Dr. Kellogg was red-headed and small, a good artist whose later years were spent on the oaks and whose fine drawings Greene has perpetuated. Dr. Kellogg was the first of all the botanists of our day. There were other botanists whom I never met, but they do not come under my view here.

Theer remain now nothing but riff-raff to name, such as Scribner and C. C. Parry, who were two of the worst grafters; Charley Orcutt, who had much talent, but was petted by Cleveland so much that he swelled up like a toad and—burst. Cleveland was a fine gentleman who specialized on the ferns.

THE "PUSH" AS PEONIZERS.

Some time after putting out my Contributions No. 15 I got the following letter from a well known publisher, whose name I omit for evident reasons:

"Our state botanist informs me that you have issued a very interesting publication called Contribution No. 15. The one referred to is concerned with certain observations on botanical methods. I shall be very glad to get hold of a publication that speaks its mind regarding the elect in botanical circles. I find a lot of stuff is kept under cover if it concerns the 'leaders.' E. L. Greene once wrote a brochure scoring Asa Gray and several more, but he was dissuaded from publishing it. I saw a letter a long while ago from an editor asking whether it was policy to let Aven Nelson have two pages in which to describe some new species. Well, let me have No. 15 as soon as convenient."

That there has always been an attempt to suppress undesirable botanical publications is manifest to anyone who thinks. That the suppression of such things is desirable to the "Push," at least, is also self-evident. But the question is, "What right has the 'Push' to attempt it?" Anyone who is familiar with botanical literature for the last sixty years knows that there was great friction between workers, and when the original workers died there sprang up institutional jealousy, which now is rampant. My first acquaintance with this spirit came when I read Gray's rasping and deserved attack on Buckley for deliberately proposing his own names for new species in the herbarium of the Philadelphia Academy of Science in place of the manuscript names of Nuttall, the discoverer of the species. All older botanists know that money was not available to Nuttall to publish his new species and genera, and for this reason Gray felt that Nuttall had the first right to name his own species, which names should be conserved. In the Flora of North America by Torrey and Gray they carried this out to the limit. But the publications even of Nuttall's names without his sanction angered him, and his correspondence with Gray shows it unmastakably. Gray by the sheer force of his personality and sharp pen awed most men into silence. Then as the years slipped by the homage given to him by all of us because of his remarkably good work led him to feel that he had a vested right in the publication of new names. Along in the eighties there began to come up systematists who had spent their time and money in exploring the great west. The most active of these men were Brandegee, Kellogg, Parish, Cusick, Greene and myself. We were all content at first to send our specimens to Gray for naming. And we were the men who built up the Gray Herbarium. Gray would

farm out the material to Watson, Engelmann, Boott, and possibly some others, but he still held the strings on us all. Then Greene and I soon began to publish our own species, for we felt (rightly) that we knew more about the western flora than Gray did. Gray at once rebelled and tried to shut us off from publication by writing to Coulter (Botanical Gazette), and the Torrey Bulletin and demanding that they do not publish any species by anyone till the proposed species had his approval. This led to the refusal of those journals to publish our species till we had Gray's permission. And later on they published an agreement to that effect, or substantially to that effect. I have in my possession a letter from W. R. Gerard, editor of the Torrey Bulletin, informing me of the fact. My reply to him was that I considered his action as pusillanimous, but that I would follow his instructions if I ever offered any more MS. to him for publication—and I never have offered any MS. to the Torrey Bulletin since. After Gray and Watson died there sprang up a number of botanical publications which failed to heed the compact to submit to Harvard new species; among them was Zoe ,published by the Brandegees. The editors of this journal requested articles from me, and for some years I printed all my new species in that journal. Later on, when my articles got bigger, I felt that it would not be convenient for me to have them split up in various issues, and so I became my own publisher. There never was any attempt on the part of Zoe to restrict my publications, but I felt that it would be better for me to become in fact a free lance, for I felt that soon or late I would come in conflict with the "Push." I have always felt the highest respect for the talent of Gray and Watson, but I also felt that there was no room for czars in American Botany. Robinson has kept up the old tradition about Harvard, and deserved our support, and I consider the continuation of the Synoptical flora by him as a fine piece of work, however much I disagree with parts of it. So far as I am concerned there never has been any attempt on the part of Harvard to restrict my publications since the death of Gray, and any attempt would have been met at once with a rasping refusal. But there has been in another way an attempt to gobble botanical work by subsidizing workers under the direction of the Bronx. No other excuse can be given for the production of Small's flora of the southern states, Rydberg's second flora of Colorado, and Abram's second edition of the flora of Los Angeles. Some years ago I received a request to furnish botanical articles for the Proceedings of the Biological Society of Washington. This request came from the editor. My reply was that I would do so if there was no attempt to dictate to me on the subject of nomenclature, for I would submit to no dictation in the matter. The reply was that they followed the "American Code" and would expect all articles to follow it. I have never submitted any articles. Whether the "Push" still tries to control American botany I do not know, and I do not care. But one would think that there is still an undercurrent in that direction. Since the advent of Coville in the Department of Botany of the Agricultural Department at Washington, there has been a steady reduction in the efficiency of the pub-

lications till the recent publication of Tidestrom's Flora of Utah and Nevada, which is a scream. I suppose that this is due to the peonizing of the workers. Two years ago one of the heads of departments informed me with a great air of heat that he would not let any employee of his department criticise his superior in any matter. Just why certain men at the heads of things in Washington are to be immune from just criticism for their smart Aleck performances deponent saith not. No man who has any self-respect would submit to such a thing for a minute. Everybody knows that for many years that about the only way a man could get up in Washington was to become a contemptible lick-spittle. And if this is still true the quicker we clean the cowards all out the better it will be for American manhood. Everyone knows that all through the ranks of education there is this tendency to demand implicit obedience to superiors. Institution after institution has had a revolt of the professors against domination. In Salt Lake six of the leading professors pulled out from the domination of the Mormon church in the affairs of the state university. Stanford also had its defection, and many other schools.

The explanation of this attempt to dominate scientific men is only an illustration of the age-old fact that all society is run by half-wits. I never have belonged to any society or organization that did not in time come under the domination of such people. The reason is that good men will not fight continuously for any good thing. After a while they get tired of strife, and so they pull out and let the half-wits run things into the ground. Theology is a conspicuous example of the domination of the half-wits. If one should look back a very short time he would find that this great government was started by men tired of the domination of half-wits. For this reason and others like it I insist on doing my own thinking, and I tell those who would dominate me to go to the devil. No doubt it would be a good thing if we could suppress all the half-witted stuff that is printed, but the selection of a censor is the rub. So the American Government was founded on free speech. Now, at this stage, when we are supposed to have acquired a little sense, this reverson to what caused the creation of this nation seems particularly stupid.

These remarks are not meant to apply to the large number of good men who are connected with the Government departments who are disgusted with the peonizing tendency as I am, but who for various reasons are not heard from in proportion to the din raised by the nuts. But I want to make it certain that whatever hue and cry may be raised by the half-wits we in the west are not perturbed, and at least think we still know black from white, and propose to rasp the half-wits wherever we think they need it. In 1897, when I was visiting the Bronx, Britton took me out to lunch and during the course of conversation said that he did not like to be made fun of. I never thought that either he or Rydberg liked it, and my criticisms of them were not written to please them. I always felt that to get under the domination of Britton meant to become peonized, just as Rose later became, and I never hankered for that kind of slavery. I much prefer to pay my own bills and

snap my fingers in the face of the bosses. Of course the cowardly pussyfoots throw up their hands in horror at any baiting of the "Push." Who cares?

Some years past there was an insistent attempt to fasten by improper means on this country the so-called American code. This code has some good features, but is fatally defective in others.

I favor priority of varietal names.

I emphatically oppose "Once a synonym always a synonym."

I oppose redundant names and never shall use them, such as Astragalus astragalinus.

I oppose the required descriptions being in Latin, for the reason that English is today the world language. It would not discomode me to publish my descriptions in Latin, but I am opposed to the principle. I was educated for a professorship in Latin and never thought of being anything else. I favor correcting improperly made names without taking them away from the author. Such as Eriogonum trichopes Torrey, which should be trichopodum, the proper Greek term. I freely admit that uniformity is desirable. I oppose recognition of all genera printed without species, unless they were provided later on with species, such as the Adansonian genera. Exceptions should be made whenever they will aid stability. But as we know the whole burden of Nomenclature change today is propaganda. Attempts to get us

I think that the taxpayers of this nation should put an immediate end back to the effete European ways.

to all attempts to peonize workers. I am convinced that there is more of it now than there was in 1894, and there was plenty of it then. Officialdom in Washington right now needs a drastic housecleaning, and the men who think they own the Government should be turned out to grass where the other jackasses are. I am not making any wild guesses when I write this, for I was for 40 years intimately connected with the Department of Justice, the Agricultural Department and Geological Survey in various ways. One example out of the many I could relate as personally known to me is the Coal Fraud cases. I was one of the two chief experts in the cases tried some 15 years ago in Salt Lake City, involving millions of dollars in value of coal laids stolen from the Government by the railroads. After my testimony was all in the railroads begged for a continuance, and at the end of the period came in with a compromise with the Government of all cases. It is a curious fact that the wife of the chief attorney for the Government got a legacy of $50,000 from a realtive who conveniently died at this time, but those of us who bore the brunt of the battle never got more than our per diem and had to fight to get that. I have seen so much incompetence and rascality in the various departments of the Government that I feel excusable for refusing to kowtow to the higher ups when they tap on wood and loudly proclaim their own impeccability. Many times I feel like joining the ranks of those who demand a showdown and reforms to secure a housecleaning, for I think I could make the fur fly. The right of self-expression is an inalienable one in an American citizen, for it was this that caused the Pilgrim fathers to migrate to America and found this nation.

As to whether there is any disposition now on the part of Government officials to inflict silence on the part of employees below them so that they will not dare to tell any truth or express any opinion about the correctness of opinions of their superiors, or any attempt to punish outsiders who disagree with them, certain things which have come up since the publication of my Contributions No. 15 certainly look that way, and whenever I feel sure that this is the fact there will be an investigation of the Department of Agriculture that I think will rattle a few dry bones. The disposition to militarize the Government has had an impetus since the war that is disastrous. No first class men will tolerate any such thing long. And if the departments are to be filled up with slaves the quicker we who pay the bills find it out the sooner it will be ended. Heads of departments are not hired to boss but to serve.

To me the most infamous sin is that of trying to suppress the right to individual expression. We find this tendency everywhere; it is essential to the dominence of the half-wits. It often hurts to have our stupidities exposed, and it pleases to have them glossed over, but the end is always bad. Even the best of men often slop through work that they should do well. If we were always brought up with a short halter it would be far better for scientific research. There is always too much of a tendency to worship our forebears, and to do homage to dignified people, when in fact dignified people are always ignoramuses. This is the cloak they put on to hide incompetence.

Interested parties might speak of this slur on a Government attorney that I have made above, as taking an unfair advantage of a perfectly legitimate event (that might have happened once in a million times) to dicredit an innocent party. No one would regret more than I to make such an error. But certain things in my intercourse with that attorney led me to feel sure that if he could have bribed me he would have done it in the case in point. In addition to his utter incompetence to handle the case was evident to all throughout and had not the opposing attorneys tried to discredit the Government witnesses the case of the Government would have fallen flat. But they were not wise enough to let the witnesses alone and so brought out the facts that definitely defeated the railroads and compelled a settlement rather than to send the experts of the railroads to jail for perjury, and attempted bribery, and the stealing of public documents from the Government archives.

In "Desert" I have written of Dr. Engelmann.

581.979
J72c
no. 17

CONTRIBUTIONS
to
WESTERN BOTANY
No. 17

MARCUS E. JONES, A. M.

BIOLOGY

CLAREMONT, CALIFORNIA

Issued September 3, 1930

BOTANICAL REMINISCENCES

When I printed my notes on Botanists whom I have known I had no idea of the kind of reception they would have, nor did I care. I felt that any remarks about the older botanists would be welcome to some, as they would be to me to get any notes pertaining to Gray, Watson, Nuttall, Pursh, Torrey, etc. But it appears that there has been a general interest created by them, and request has come from several sources to continue them. I never intend to follow the beaten path, nor to trim my sails to suit readers, if they do not like what I write they can leave it. I think it a sin to tell only the palatable things about people. You never get a correct mirror of them in that way. I have no sympathy with concealing the truth about the dead. I abhor hero worship. When a man sets himself up as a little god I feel like taking a shot at him.

In Desert, responding to an insistent appeal for information I wrote my impressions of Engelmann, which also met with a general interest. I here reprint the article.

DR. GEORGE ENGELMANN

(Reprinted from "Desert")

I suppose in the lives of all of us there stand out men and women whom we feel honored to have known. One of them is the subject of this sketch. The other is Mrs. T. S. Brandegee, the greatest woman botanist that ever lived.

Dr. Engelmann was born in 1809, and after his education in Germany emigrated to this country and settled in St. Louis. He belonged to the pioneer age in American botany, a period when systematic botany was in the formative stage, when men had to guess as to what was a genus and species; when men had to delve deep into the secrets of Nature to find the laws governing the origin of the vegetable forms we call species and genera.

From the standpoint of quality of product I consider him the greatest American botanist. He belonged to the age of Bentham, Hooker, Torrey, Gray, Engelmann and Watson. Torrey was much older, having been born in 1798, Gray in 1810. Watson was much the youngest. All of them were educated as physiological botanists, not as systematists. They had to make systematic botany as we know it. We therefore find them emphasizing structure inordinately, and from this foolish standpoint we have not yet got far away. They had to work under the artifical system of Linnaeus, and it took many years to get away from it. The great task of systematic botanists is to devise a system of relationship, showing the genetic origin of all plants in order. Engelmann had to do with this system in which the highest plants were considered to be dicotyledons, then the next lower the monocotyledons,

then the polycotyledons, the flowerless plants, like the ferns and club-mosses, algae, and fungi and lichens. The dicotyledons were divided into polypetalae and apetalae. This was the order till the time of the death of Engelmann. Since the time of Engelmann, Engler and Prantl, and others since their time, have tried to arrange plants in the natural order, beginning with the lowest order and ending with the highest. This has brought order out of the chaos that prevailed in Englemann's time.

Engelmann, because of his microscopic methods of going into every detail of structure, confined his work to certain families and genera of plants. He was considered the court of last appeal in Cuscuta, Juncus, Yucca, Agave, the Coniferae, and Cactaceae. His reputation will always rest most on the magnificent Cactaceae of the Mexican boundary, done in stipple and lithographed on stone. No work ever produced in America rivals that production. His handwriting was execrable, fully as bad as my own, which my wife used to say I could not read when it was cold. He would write a letter or two of a word and then make a few wiggles to denote the rest of the word, and you had to make it out the best you could.

Like most great men, Engelmann was perfectly informal and approachable, as humble as a child. When he visited me in Salt Lake City, in 1880, I laid out on the bed a series of cactus specimens illustrating the intergradation of Opuntia Missouriensis and rutila, and I turned to him and said, "Doctor, tell me where Missouriensis begins and rutila ends." He threw up his hands in mock surrender and said, I suppose I shall have to suffer in Purgatory for making too many species of Cactaceae." Then he wanted to take a swim in Great Salt Lake. No visit to Salt Lake City is complete till you have taken a swim in the dead sea of America. So I was invited to go with him and Parry on the morrow, to the lake. On arriving we found much difficulty in getting a suit large enough to cover his ample midsection, for he was wider than a New York alderman there, but at last we got him duly covered ,and he walked out into the water. The ubiquitous Dr. Parry was supposed to be his chaperone and see to all details, but he had never been in the lake before, and so deserted the Doctor as he walked into the water. When Dr. Engelmann reached water up to his hips he was floated off his feet and promptly turned over, head down, and began to strangle, for he could not swim. After swallowing much water in his lungs someone saw his distress and went to his aid and set him on his feet, but he was nearly dead, and coughed terribly till the water was all out of his lungs. Then a very severe inflamation set in that sent him to bed for some days.

My correspondence with Dr. Engelmann continued till his death.

He was the head and front of the Missouri Botanic Garden and the great herbarium there. One of his most intimate friends was Shaw, a rich man, for whom Agave Shawii was named. Before Engelmann's death the garden was called the Shaw Botanic Garden, but after his death the name was changed to the present one.

Dr. Englemann was a most intimate friend of Gray and the other great botanists of his time.

C. C. PARRY

In the early years Parry, who lived at Davenport, Iowa got into correspondence with me because his name was the most prominent at that time, doubtless because he was the physician on the Mexican Boundary survey, and posed as a botanist. He was selected as the botanist of Capt. Jone's survey of the region of the Yellowstone Wyoming in the Teton region, and found a very small number of plants that were new at that time. A little later on he was appointed as botanist of the Department of Agriculture, the same position occupied by the genial Dr. Vasey later on..

Parry was a typical toady, as most men had to be to get a position in the Government service. He was a suave, well groomed society man with little brains, a great feeder of hot air, who slobbered over the great to keep in their good graces. He seemed to have pulled the wool over Gray and Engelmann though I doubt if he ever was a real friend of either.

I assume that he was with Gray and Hooker in their trip across the continent in the sixties, for he told me of the meeting of the two men with Greene in Silver City, New Mexico, where they spent the Sabbath with him and attended the service at which Greene preached on "Consider the lilies of the field" etc. Parry told me that Greene preached a very good sermon. It will be remembered that Greene was an Episcopal minister in charge of the parish at that time in Silver City.

Then in 1880 Parry accompanied Engelmann on his trip across the continent, and acted as a kind of chaperone for him. This was on the supposition that Parry knew the country, because he had spent a month or so in southern Utah at St. George botanizing, where he camped on J. E. Johnson for a month. During that time Parry and his wife were the guests of Johnson, lodged and boarded by him. I have spoken about him as being a typical grafter because after getting free board and lodging for a month (because he was such a famous (?) botanist), and when he left he presented to Johnson with much ceremony a thirty-five cent linen prover microscope as a memento of his visit.

My next acquaintance with Parry was in 1882 when I was on a botanical tour in southern California. It so happened that Parry was at the same hotel when I arrived. I did not know of his being there till he hunted me up and introduced himself and wife. He then informed me that Pringle had just come in on a botanizing trip, and he suggested that we three make up a party and go to Ensenada together. This was agreeable to me and it was soon arranged. Pringle was an old correspondent of mine, but we had never met. Parry took on himself to arrange for the trip by hiring a team and buggy of Mrs. Orcutt and employing her son Charley, a lad of nineteen years to go along as teamster and cook. I then learned that Charley was interested in shells and was a protegee of Daniel Cleveland who was also a resident of San Diego, a wealthy attorney and a great fern lover, and influential citizen. Pringle had his own outfit and a young man as helper.

So we started out with our rattle trap of an outfit and drove to Tia Juana and camped the first night. The next day we drove through the Valley of the Palms and botanized along the way. Charley Orcutt magnified his position till he became intolerable, and he was always toadying to Parry and neglecting his duties. So I took his aside and reminded him that I was paying half the expenses and expected service from him, and would see that he gave it if I had to beat him up. He saw that I meant business and after that sullenly obeyed orders. He was a gawky stripling with fuzz all over his face. That day we had to go over a steep hill and so I got out and walked up it and Charley drove. He was always gawking around and paying no attention to his driving, and going up the hill he fell out and landed on a shotgun which he had brought along for his own use, and he bent the barrel.

In a few days we reached Ensenada and camped along the beach. Parry at once ambled off to the town, and I went out on the hills to botanize. I found a new species of Cereus which I later named C. maritimus. On the way down to Ensenada, when we all three were in the buggy I saw a new rose growing in the brush and stopped the team to get out and collect it. My eyesight was better than that of anyone in the party or they would have seen it. I unwisely showed my new discovery to Parry and he climbed out and got some specimens, and later on called Pringle's attention to it. As a rule I do not show my collections to other botanists. Parry found some white people living in Ensenada, among them Miss Fish, whom he got to promise to send him collections, and who later on did send a few, among them some new species. After a few days there we started back for San Diego, quite well pleased with our trip. When we reached Tia Juana again it was Saturday night. I had never up to that time ever collected a specimen or traveled on Sunday, and so I wanted to remain there over the Sabbath, but Parry said he could not wait as he had urgent business in San Diego and had to get back at once. So he agreed to send Charley back in the morning with the team if I would not object to his going right in. Some months later on I found that Parry's urgent business was to steal my new rose from me by sending it in to Engelmann and having it published before I could attend to it. This was Rosa minutiflora.

Charley Orcutt did not come back till Wednesday, and he brought his big brother along with him, and it became evident that they were up to some bad business for they put up the team and went in to eat dinner without speaking to me. I felt that something was brewing from the sour looks of the pair. So as I had a big six shooter pistol that I always carried—and never used, I got it out and oiled it up so that it would shoot at least once without jamming, and strapped it on me. Then I went out and hitched up the team and got in prepared to drive to San Diego. At this juncture Charley's big brother who had stood around while I was hitching up sprang in front of the team and took them by the bits and said I would not be permitted to drive the team till I had paid my bill. There was no bill due till I got to San Diego. So I leveled my pistol at him and told him to get out of the way, and he did in a hurry. So I drove in to San Diego and let

him and Charley walk the twenty miles. When they got to town they went direct to the editor of the daily paper, the San Diego Union, and made out quite a weird story of my performance as a bad man. The editor made quite a half column of screed that was good reading. So when it came out the next morning I at once sat down and wrote the facts of the case and requested the editor to print it ,which he did. Then the oily Parry came to me and wanted me to pay my bill for the trip. I told him to bring it in and I would settle it as we had agreed. But when the bill came it contained among other items a charge of $10 for the ruined shotgun, and other extras. I promptly refused to pay any of them, but agreed to pay just what we had agreed on before the trip was made. So I gave him a check for the amount and told him to sue for the rest. Parry tried to scare me into paying extra by saying that they would arrest me for pulling a gun on them, and would give me other trouble. I told him to start the ball a rolling at once and I would stay an extra day to enable them to prosecute me. Being something of a lawyer I knew they could do nothing, and that they were only bluffing, and it turned out that way.

Parry remained in southern California till he wore out his welcome, for he was always sponging on people so long as they would permit it. His wife was an excellent lady.

That trip with Parry and me convinced Charley Orcutt that he was a great botanist, and he began to swell around like a toad. Later on he took several trips into Mexico and collected several new species. His chief difficulty was that there was not room enough in California for himself and other botanists. He was crooked financially, and impossible to get along with, and yet he had considerable talent, but the petting he received from Cleveland and others turned his head, and he never amounted to anything.

On our way back to San Diego we had a long hill to climb, and Parry said he would walk and cut across and meet us on the top. I also walked to relieve the team of my weight, and on going up the hill I found Draba unilateralis a new species. When we reached the top Parry was not to be seen, and I feared we had left him behind. So I stopped the team and went over to a hut near by where a young Mexican woman was standing, and asked her in my best English if she had seen an old man going along the road. She smiled sweetly and said "Quien sabe." Then I tried to manufacture some pigeon English, and conjured up all the Latin I could think of in various expressions to make her understand what I meant. But the reply was always the same. This was my first experience trying to talk to someone who could not talk English. Finally I had to resort to pantomime to get her to understand. At this juncture Parry showed up. I decided right there that I never would be caught in such a fix again. So I got a Spanish dictionary and reader and began to learn Spanish. Two years afterwards I thought I had become rather proficient, and could if conditions warranted make up out of Latin what I lacked so that I could talk to Mexicans. I was at El Paso, Texas, and it was hot and dry and I was hungry for a watermelon, for there were piles of them for sale along

the sidewalk, but I did not know the name for them. So I promptly walked up to a Mexican and said "Quanto dinero por una aguamelon?" He grinned and replied in perfect English "Five cents for a watermelon." I knew I had put my foot in it but did not know how. So I sneaked off behind a building and pulled out my dictionary and found that sandia was the name for watermelon, and melon was the name for muskmelon. Since that time I have been a little skittish about manufacturing Spanish out of Latin.

"THE PUSH"

If I were seeking public commendation I should be much gratified at the reception of my article on this subject. For I have received more commendation for it than for anything I ever wrote, showing a general feeling among botanists that something must be done to get rid of domination in botany in Government circles. I do not however care what the public thinks about my writings. They are printed to get certain facts before the public, and if the public does not like it, then it can go hang. A person who attacks anything must expect reprisals of all kinds, misinterpretations of his motives, personal spites, and the like. It has been my lot for forty years to be a court expert, where I have come up against opposition of intrenched authority in testifying against the inroads of greedy corporations. So I am not frightened by reprisals. Come on boys and kick up the dust. I will try to see that you get what is coming to you—and then some. Government circles have always been full of cowardly pussyfoots who would be shocked to death if they accidentally said their soul were their own. The colleges are now beginning to fill up with the same brand of half wits, while the really big men stay out, all because real men will not endure being bulldozed. So it is time that someone raised his voice to stop the evil.

To my mind there is no sin so heinous as that of assassinating a man by denying him his right to individual expression. And no man can sink lower than to become a cowardly pussyfoot.

In exposing the tricks of the cowardly pussy-foots, whose squawks are very familiar to those of us who have had to fight intrenched authority, I take the position that they have as much right to express their opinion as I have, and to print anything that they can get in print, and to put over anything that they can make stick, even if it is accomplished by guile and unprofessional methods. But I take pleasure in showing up the unprofessional and unscientific tricks as tricks when they come out, in order to forewarn the younger generation that all is not gold that glitters. If these men stood on their own achievements, and did not assume much more than they ever have done, there would be little opposition, but when my good friend Rose, in a moment of weakness attempts to put over the impossible by a bit of bluff as he did in replying to my strictures on his fake genera, I feel perfectly free to call attention to the bluff, and label it as such, and give my reasons for so doing.

So far as I know, Britton never but once tried this game on the botanical public when he attempted to discredit the work of Mrs. Brandegee by intimating that she had no "Botanical intuitions". Since then I have been calling on on him to show some "botanical intuitions" and up to date there has been no reply. Had Britton in the beginnig used the methods he has used of late, he would have got attacks only on his ideas, but as everyone knows who was doing botanical work forty years ago he did not play the game on the square. He had for years been plotting the downfall of Harvard, but was too cowardly to come out into the open until after Gray and Watson died. Then he put through the American Association a seemingly innocent vote to prepare a new list of American species of plants. This, on the face of it, raised no comment. But it was intended to give to him and his hand-picked committee, the sanction of the A. A. S. for anything they might propose, but it was not so understood by those who voted for it. A year later when the product of this committee was published as the official output of the A. A. S. and proved to be a new botanical system, it raised a nation-wide howl, and was repudiated by the great majority of the A. A. S. Then Britton had to take a new tack.

So he wrote to a selected few whom he thought were in favor of his scheme suggesting the formation of the Botanical Society of America. Even his hand-picked few turned the scheme down, saying the time was not ripe for such a move, but he went ahead and formed the Society with his rump coterie. Respect for the opinions of the botanical world required him to invite Harvard to help form this society. This was turned down and Robinson would not join it. Since then the organization has passed out of his control more or less and become more representative. Then Britton's last move (which should have been his first) was the starting of the North American Flora and its financing by himself. In this his peculiar views on botany are duly set forth by his henchmen, particularly Rydberg. But the assumption of superior knowledge and "botanical intuition" is conspicuous by its absence.

Britton's method is the effete one of Europe, which was rejected by Kew and the leading American botanists of the last generation, and I need not go into detail about it here.

WOOTON AND STANDLEY'S ASTRAGALI

It has been my privilege recently to examine the types of these proposed species. None of them are any good. In their key they show a gross ignorance of relationship, putting Sonorae (humistratus var.) next to lotiflorus; and albulus (humistratus) next to remulcus. In A. altus they do refer to its relationship to Rusbyi. It appears to be a form of strigulosus. On A. albulus there was written in plain hand by, myself some years before the publication of this species, and on the type sheet that it was A. humistratus. There is no recognition of this fact in the description of this species. On

the contrary they say because of the incompleteness of the specimen its relationship cannot be determined. Now the facts are that this particular form of humistratus is the common one in the pass going over to Alamagordo, in the Organ Mts., just east of Las Cruces, in the spring, and its sheathing stipules are found in no other allied species, and it is common.

Their identification of A. tephrodes showed that they did not know the species, for they mixed it with other species with fleshy pods.

The whole "Flora of New Mexico" shows the same character of being done with a lick and a promise that characterizes all of Standley's work. He will not get very far in systematic work until he stops slopping through his work, in a mad effort to do a great deal in a very short time.

BOTANIZING IN TEXAS, 1930

In 1884 it was my privilege to botanize at El Paso in April and in the fall. The plants got there were unusually interesting, and led me to desire to revisit Texas at some later time and extend my visit eastward to the prairie region. For the only accounts we had were those of the railroad surveys and of Lindheimer. Later on Havard had done some work along the border mountains. I never felt that I could afford the trip till in 1903 when I went with my son to El Paso and thence to the Sierra Madres of northern Mexico. This trip was a very productive one in new species. But I did not get east of El Paso. But have had longing eyes for the region ever since. I abandoned collecting sets as a regular business in the eighties, and devoted my time to a more profitable work in economic geology. It so happened that I had two months' time to spare in 1930, and so I decided to employ it on the long-delayed trip to Texas.

I left Claremont, California April 1st. 1930. I drove to Shaver's Well, California. The next day I drove to Quartzite, Arizona, botanizing on the way, particularly at Blythe. The next day I drove to Aquila, a station west of Wickenberg, Arizona, where I got considerable stuff. Thence I drove through Wickenberg, stopping just west of there to study Canotia and collected a little. The next day I drove to Phoenix, and the next to Tucson. Then to the Huachuca mountains in Ramsey Canon where I was last year. Then I drove to Lowell a smelter town near Douglas. The next day I drove through Douglas and then on to Las Cruces, New Mexico. Then south 40 miles to El Paso and then east to Sierra Blanca, Texas. There was considerable out in bloom there on the mountain to the west. Then I drove to Davis Junction where the road forks. I took the lower road east instead of going to Pecos, for my destination was the experiment station at Sonora, which is some 90 miles north of Del Rio. At Sonora I found that the station was 19 miles south on a state ranch. So the next day I drove there and remained three days with the men connected with the work. We went pretty well over that region studying the vegetation and stock conditions. We then took a trip some fifty miles west to a stock ranch to examine con-

ditions of stock poisoning due to Oxytropis. Before we left in the morning the veterinary and I made an autopsy of a sheep that died the night before. My reason for being present was that for some twenty years I had been at the head of investigations on stock poisoning by smelter fumes in Utah and was familiar with clinical examinations of all domestic animals.

There are some twenty-six experimental stations in Texas devoted to the work of stock betterment and protection and agricultural experimentation.

The next day I also went with the veterinary to a ranch near Rock Springs where a number of valuable goats had died from weed poisoning.

As a result of all these examinations, I came to certain definite conclusions. In order for the public to get a proper alignment, to understand my position a brief statement of conditions is needed. Practically all of Texas is divided up into great ranches, and all fenced in with chicken-wire fencing. Then certain square miles or great areas are devoted to sheep, or goats, or cattle or horses, and here and there where conditions demand it wells are sunk and windmills erected to pump water into surface cisterns, from which it runs to troughs suitably located. There is no herding of the stock for the chicken-wire fence is supposed to keep out Coyotes. A general lookout is kept by ranch riders for predatory animals, and to see the condition of the stock and water supply. Winds frequently wreck the windmills and cut off the water supply. No particular watch is kept on the number of animals pastured on the ranches, but they are allowed to multiply as fast as possible irrespective of the quantity of feed available, and little or no attempt is made to raise feed to tide the stock over a dry spell. In ninety percent of the cases the range is so overstocked that the grass is eaten down to the roots all the time. That is, the range is sheeped out. This leaves bare spots where noxious weeds come in and grow luxuriantly. Because normal stock will not eat them. In fact wherever stock refuse to eat any plant it is sufficiently evident that the plant is poisonous. Now the question put to me was What must be done to prevent stock poisoning? My reply was "Send the big ranchers to jail for cruelty to animals." This is the key to stock-poisoning throughout the West. It is clearly criminal for anyone to put stock on ranges where there is no feed for them, and a few years in jail will do these men more good than any amount of argument. The experiment station men should be endowed with police authority to enter premises and see if conditions warrant the number of stock on that range, and if not, then the owner must provide the feed or get rid of his stock. When I was just west of Fort Davis, Texas, I passed a beautiful ranch where the grass was knee-high and the cattle rolling-fat. It so happened that I saw large patches of Loco poison along the road and got out to collect some. While I was at it the owner came along with his boy and wanted to know who and what I was. I said I congratulate you on being the only sensible rancher I have seen in Texas. He asked in what respect I meant it. Well I said your ranch is not sheeped out, and your cattle are in fine condition. So we became fast friends on the spot. He explained

how he did it by saying that he always kept feed on hand for emergencies and never overgrazed his range.

If our Government poison squad were allowed to do their own thinking instead of frantically chasing all over the country digging up weeds and testing them for poison they long ago would have suggested just what I am saying now. Any stockman knows that what plants their stock avoid are poisonous to them. And any stockman knows that under normal conditions stock are never poisoned if they have enough grass feed to eat. It is only when the range is sheeped out that they are forced in desperation to eat the harmful weeds that they get poisoned.

It surely was a surprise to me to find the range all fenced and none of the vast wild area of two generations ago, when the great cattle barons used to trek a thousand miles across the range to market with their herds. Del Rio, some 400 miles down the Rio Grande in the wildest of the wild region where the bandts and Mexican guerillas used to hang out I imagined would be composed of a few shacks, a lot of saloons, and a horde of swaggering cow-punchers. Instead I found a city of 4000 people, paved streets, electric lights and gas, and decent, well educated people and no cow-boys. Along the river where a person can wade across almost anywhere I saw no sign of smuggling, and I went to the river in three places many miles apart at the Hot Springs and the Indian Hot Springs. There was every convenience at the Indian Hot Springs including electric light and hotel accommodations. I saw only two Texas rangers, young men wearing revolvers conspicuously and in a way that no real gunman would ever wear one. I did not ask them if they were just from New York, but fellows wearing spats usually never lived in the region of overalls and high-heeled boots. I saw no young women smoking a pipe and only one flapper smoking a cigaret, and I could find ten times as many right in Los Angeles. I did not see half as many flappers in all Texas as I would see in my own home town. I guess the only place now to find the wild and woolly people is in the story books.

My chief interest in western Texas was to get a solution of the life zones there so as to check up with the rest of the west. To understand the life-zone situation one must know something of the topography and geology. So far as I have traveled, all of western Texas seemed to belong to the Cretaceous period topographically. There may have been a little Jurassic formation in extreme western Texas, but the general situation was that of a great Cretaceous plain elevated to about 2000 feet above the sea, and getting a little lower in elevation as you went eastward. This plain undulated somewhat so that drainage areas were formed which for the most part trended down ward toward the Rio Grande. The oscillation of the slopes due to erosion had a tendency to form escarpments along one side of a creek or river, or occasionally as with the Pecos and Devil's rivers forming box canons of short extent, but with these few exceptions the general surface was gentle in slope. In extreme western Texas there is little or no sod, and the prevailing vegetation is the mesquit or creosote bush or Chenopodiaceous

shrubs where the drainage is slight. But as we go eastward there is an imperceptible infiltration of sod grasses till at Alpine there are vast areas all covered with sod, forming real prairies, and we come to unmistakable prairie vegetation. I see no cause for speaking of the region as being divided by the Pecos.

This is characteristic of Wooton and Standley's Flora of New Mexico where one is led to expect a marked change on crossing that dribbling stream.

I am told that before the advent of fencing the range the whole region from Alpine east was a vast prairie, but now almost everywhere there is a forest of live oaks and attendant shrubbery. But one must not think that my discussion of the geology embraces the whole region. I mean the ground work of the region is an elevated floor of a Cretaceous sea where the rocks were mostly limestones. But it is well known that in any vast region like this volcanic activity must prevail, and here and there the strata are tilted at high angles into mountain chains, mostly low ranges, and in others there has been an exudation of lavas forming mountains such as the Chisos range. These diversify the surface and furnish many springs, but no running water except the Pecos and Devil's river, and the latter is the only one deserving the name of river. The mountains rarely reach 6500 feet elevation, and so do not seem to have much real forest except here and there in the gulches. And they have no alpine vegetation, and so far as I saw no spruce vegetation. At cloudcroft there was Middle Temperate vegetation, and the only range reaching 9000 feet alt. At Kent and Alpine the hills seemed to belong to the Lower Temperate, where the live oaks prevailed. All the rest was tropical, shown by the presence of Larrea and Mesquit. On the flanks of the low ranges just on the edge of the Tropical are vast areas of Yucca elata and macrocarpa, with a few patches of Agave. I have elsewhere given my reasons for discarding various species of Yucca and Samuela recognized by Trelease.

Going down to the Rio Grande river from Sonora off the high plateau to Del Rio I was greatly disappointed to find the river wending its way along a great plain, and to find a gradual infiltration of Mexican plants, but there was nothing like the great change in vegetation noticeable at Cajon Pass, California, or the region from Kanarrah to St. George, Utah, where the life zone limits are conspicuously sharp. It was a delight to see Lepachys columnaris and Gaillardia pinnatifida saying "Hello," as I passed along. It was a delight to come upon the buffalo and grama grass. It made me feel, that a few hundred miles more to the east and I would again be on the real prairies of Iowa. The presence of such genera as Engelmannia, Lidheimera and Zexmenia spoke unmistakably of the southern nature of the vegetation.

U. OF ILL. LIB.

A SWING AROUND THE CIRCLE

After completing the identification of my Texas plants collected in April, I had a month's time on my hands, and decided to revisit the Little Colorado region that I explored in 1890, forty years ago. I knew that there is seldom any rain on the desert, and only then can one expect to get plants of interest. My experience in Texas had led me to think that I would find a fine flora on the Little Colorado. On June 10th I started for Flagstaff, Arizona. I drove east to Amboy and then north to the Providence mountains for a few day's work, but the flora was too far gone to get much of interest. Then I passed through the Needles where the temperature was 115 degrees. Then up to Oatman where I found several interesting species, among them an apparently new Agave and Nolina Bigelovii in fine shape. Then on to Hackberry, where I was most agreeably surprised to find Canotia in fine shape. A new locality for this rare genus. Then on to Flagstaff, finding interesting things along the way. Then north to Cameron and Tuba City, hoping to find the new species I got there forty years ago. But there had been no rain in that region for three years, and so my trip was in vain. Even on the Kaibab where there usually is ten feet of snow everything was bare. So I went on to Kanab, and then up the Vergin to the beautiful Hidden Lake where I found much vegetation. Then on to Panguitch and Salt Lake City. Everything was green and fresh on the way.

Then after a day visiting at my old home I left for Elko, Nevada, and got the very rare Eremochloe Kingii Watson at Wendover. Then I drove north over very bad country roads to Owyhee and Mountain Home, getting interesting plants on the way. From there I went west along the Columbia highway over fine roads to Arlington, Oregon, where I ferried across the Columbia, and then drove up on the great plateau to Bickleton. Then back to La Grande, Oregon, and the Wallowa mountains at Wallowa lake, where I botanized two days. Then back to Baker City and south to Stein's mountain, some 200 miles towards Winnemucca Then to Winnemucca, where I took a side trip to Battle Mountain to get Astragalus pterocarpus, the only known locality for it. It was obliterated in the type locality, but I found plenty of it a few miles away. Then back to Winnemucca and on to Lake Tahoe. Then home through Sacramento to San Joaquin valley. None of the region was new to me except Elko-Owyhee, and the Baker City Winnemucca trip. The roads in that region were very poor but passable, but the main highways were fine.

My reason for visiting Stein mountain region was to get onto the flora where Cusick many years ago got some fine things, but I was too early for the high flora and too late for the low flora, but in spite of this I got many interesting things in this region which is so hard to reach.

LOCALITIES IN LOWER CALIFORNIA

In my botanizing in the lower part of Lower California there were few localities visited. In 1926 I botanized at La Paz, which is on the gulf on the east side of the peninsula, and is the capitol of the southern half of the peninsula. Most of my work was along the shore line to the east of the town. I also took a trip to San Antonio, 44 miles south, which is on the stage route to San Jose del Cabo, and is up near the divide leading over to San Bartolomo, and is in the hills. The same year I took a trip of 20 miles south of Hermosillo to a silver mine in the Yaqui region. I also got a few plants at Carbo on the main railroad line south of Nogales.

In 1927 I went straight to San Blas, Sinaloa, which lies about 40 miles east of Toplobampo Bay, and to Los Mochis which is only 10 miles east of it. Then after stopping at Mazatlan I went to Tepic, the old and famous town in the old state of Tepic, now called Nayarit. From there I went to Ixtlan, a small town on the railroad some 70 miles east, then to La Barranca, a little station on the edge of the great barranca where they were building a bridge. This place is about 65 miles northwest of Guadalajara.

In 1928 I went by boat direct to San Jose del Cabo, which is 14 miles east of Cape San Lucas, and the only big town in that region. It has no harbor, boats having to land through the surf. Some 40 miles east of it is the pretty little town of Miraflores, on a river coming out of the Laguna mountains, where I took my horseback trip up those mountains, going ten miles west before turning up a river leading to the heart of the range. Ten miles east of Miraflores lies Santiago, and some 20 miles farther and on the coast lies the Ranch by the Sea where I did a little collecting. After leaving the ranch by the sea the road goes along the coast a few miles farther and then follows up a draw to San Bartolomo, which is near the crest of the mesa region and has some magnificent springs and raises much fruit.

The only other place needing mention is Todos Santos, on the sea, and 60 miles west and south of La Paz. I went 20 miles east of there to the foot of the Lagunas at the Coda ranch. I also went some 14 miles west of La Paz on the mesa which extends to Magdalena Bay, to get the persimmon growing there.

LOCALITIES

Shaver's Well, Calif. This is 12 miles east of Mecca, near the crest of the range and at the upper end of the canon, and just on the upper edge of the Tropical life zone.

The Hayfields. This is at the foot of the range and 14 miles east of Shaver's Well and 20 miles west of Desert Center.

Blythe is on the Colorado river, and at the end of the beautiful road from Mecca. It is only a few hundred feet above sea level and is very hot in summer.

Quartzite, Arizona. This is up in the hill country, 19 miles east of Blythe and in a valley among the mesquite. Going over to it, the road passes through a limestone area where the soil is very scanty. Quartzite itself lies back in the sandy area.

Aquila, Arizona. This lies some sixty miles east of Quartzite, in the sand soil of the plain, which extends to the hills just west of Wickenberg. Going over these hills we meet Canotia growing on the rocky slopes among the mesquite.

Wickenberg. This lies near the head of the Hassayampa river at the Junction of the Blythe-Phoenix and the Phoenix-Prescott roads. Here the Blythe road turns south to Phoenix.

Sacaton. This is on the Salt river south of Phoenix, a Government experiment station. I took the Casa Grande Ruin road out of there instead of going south, and passed by the eastern edge of the low range south of Sacaton, where I botanized on the boulder strewn hills.

Huachuca Plain. This term is used for the region east of Fort Huachuca, near the mouth of Ramsey Canon.

Ramsey Canon. This is the third canon west of the north end of the Huachuca moutains, and goes up to the crest of the range.

Benson. This is a station on the Southern Pacific R. R., about forty miles east of Tucson, where the road forks going east. Stein's is a station on the railroad nearly north of the Chiricahua Mountains and east of Bowie.

Texas Canon begins a mile or so west of Dragoon station, and leads down to the plain which leads to Wilcox and Benson. It is a short stretch winding down through huge granite boulders along a small creek.

Rodeo. This is the first station on the railroad east and north of Douglas on the plain.

Going east from El Paso over the plain, Sierra Blanca is quite a town and supplies the adjacent farming and grazing region. It lies at the foot of a range running north and south which is covered with a Yucca forest. A road runs south from here to the Rio Grande river and Indian Hot Springs. The main central highway runs east from here to Van Horn, where the road branches so that one goes southeast to Del Rio, along the border; and the

other goes east a short distance to Davis Junction where it again forks, one going east to San Antonio and the other northeast to Pecos. At Van Horn a main road also goes north to Carlsbad, and it was here that Pine Tree station is located, which is at the top of a hill going up from the plain north of Van Horn. This place is important because here is the dividing line between two life zones. From this place the road continues northward to Carlsbad Junction and then eastward to Carlsbad, and northward from there to Artesia, 35 miles, where I turned westward to Cloudcroft, Alamagordo and Las Cruces.

LOCALITIES IN THE SWING AROUND THE CIRCLE

At Amboy I turned north to the Providence mountains, passing on the way the beautiful spring in the cove of the Old Dad mountains where I got most of my specimens on my previous visit to that range. On this visit I went some ten miles farther to the Barnes ranch at the foot of the Providence. From there I took an auto trip south to the Old Dad range at some springs which are on the north side of the mountains. Then returning to the ranch I returned to the main highway east of Amboy and went on to the Needles.

East of the Needles Oatman lies near the top of the first range east of the Colorado river and here we get almost out of the Tropical life zone. Then we descend to the plain again and go on to Hackberry where the railroad goes up a canon in a low range. It is here just before we enter the canon, that we come across Canotia covering the hills much as the juniper does. From here there is a gradual ascent to the great Mogollon plateau, passing through Kingman, Peach Springs, Seligman and Williams; the latter being on the plateau in the yellow pine timber, in the Middle Temperate life zone. Peach Springs is near the lower limits of the Lower Temperate life zone. Williams is just in the edge of the Middle Temperate. The whole Mogollon plateau, except along its edges, is in the Middle Temperate.

Going north from Flagstaff toward Cameron's, we soon get out of the Middle Temperate and down into the Lower Temperate, and continue in it to below Cameron's where there are traces of the Tropical coming in. Tuba City is nearly east of Cameron's and on a branch of the Little Colorado, the Moencopa river, and is fed by springs cropping out near the top of the cliffs in the Jurassic formation.

House Rock is the old name of a water hole near a rock looking like a house, some 40 miles west of Lee's Ferry. But the old House Rock has been abandoned and an oil station near the base of the Kaibab some four miles west of old House Rock now has that name. There is a house there and a fountain fed by a pipe line where one can get fine water. All this valley now called House Rock valley is a big stock ranch or series of such ranches. From this valley the great whale-back called the Kaibab rises half a mile or more into the sky.

Kanab lies at the foot of the cliffs, which farther north and east form the famous Bryce canon.

From Kanab the road goes up Kanab Creek and over a divide and down to Mt. Carmel and the string of towns that lie along the upper Vergin river. Orderville is one of these towns, and not far above it lies Hidden Lake, a unique spot that no one should miss. This lake was formed by a slip of the cliffs forming the valley and is about five acres in extent, and surrounded by much vegetation. I did some botanizing here and along the river towards the summit. All this region is in the yellow pine belt.

Going west from Salt Lake City and around the north point of the Aqui range west of Grantsville, I collected some on the cliffs and along a wash before I got out on the main desert, the real bed of the Great Salt Lake.

There was nothing of interest crossing the salt beds till I passed Wendover and was climbing over the hills which had many patches of the very rare grass, Eremochloe Kingii, which looks like a Tricuspis or Munroa.

Elko is a well known station on the railroad, and from here starts the road leading north to Tuscarora, Owyhee, Mountain Home and Bruneau. From Owyhee, here and there, to Bruneau, are arid patches bearing a peculiar flora such as Mentzelia, Astragalus Toanus and speirocarpus, etc.

Owyhee is on a flat near a great lava mesa, and the flora is mostly Middle Temperate meadow formation. From there northward the road drops down some to the level of the Snake river clay bluffs, whose sides are scored by rain and rather bare, but what plants are found are interesting. Owyhee and Bruneau are not far from Mountain Home.

North of Weiser, on a fork of the Weiser river, is Mann's creek on the highway to Cuprum, Meadows, etc. This was an interesting region in the early spring because of the umbelliferae growing in the gumbo soil of the bluffs. But I was too late for that flora.

Stanfield is near Umatilla. Bickleton, Washington, is some 26 miles north of the ferry at Arlington, which is 65 miles east of the Dalles on the Columbia. Bickleton is on the high plateau and in the Middle Temperate life zone. To the north of it some ten miles is a long and high ridge covered with Pinus ponderosa and quite a varied forest flora.

After my visit to Bickleton I drove back to La Grande, Oregon, and from there drove 65 miles east to Wallowa lake, which lies behind a glacial terminal moraine at the mouth of a canon in the upper edge of the Middle Temperate life zone. From there trails go up into the high Wallowas above timber line.

Returning to the main highway at La Grande I drove back to Baker City, and from there southward to Winnemucca along country roads. After passing over a great mountain swell south of Baker I came down to the head of the John Day river, and followed down to Prairie City, a beautiful country town on a real prairie. From there it was not far to John Day town and Canon City, where the ground is all torn up by placer mining for gold. From there the road follows up a long way and over onto meadows in the parklike country to Burns, which lies out in the sagebrush area near the Mal-

heur lake and alkali flats. Princeton is a mail station east and south of Burns on the edge of Malheur flats, and at the base of a long lava mesa.

Then the road turned southeast, going over and through the north end of Stein's mountain and down to Alberson's ranch on the east side of the range. Then down to the old Alvord ranch on the east side of the range which lies just east of the highest part of Stein's Mt., on the edge of the desert. From here the road goes south to Field's and Denio, the latter being on the line between Oregon and Nevada.

From here to Winnemucca is a succession of flats and low volcanic mesas and sagebruch to Winnemucca.

Throughout htis region the season was past for plants. In going around the divide leading over on to Carson desert, and going out of this area near Wadsworth, there was an interesting group of plants got along the way in the sand. This region is about 4500 feet alt. above the sea.

Lake Tahoe is in the Middle Temperate life zone mostly.

La Grande Oregon. There may be some misapprehension about the spelling of this name. It is not Spanish but French from those who first settled the region. There seem to have been many Frenchmen in the logging camps around this place in the early days. It is on the beautiful plateau that is inclosed by the Blue mountains on the southeast and the Wallowas on the east, and an extension of the Blues on the west. It is a magnificent and nearly level valley all grassed over, and has a very fertile soil of black loam; and is well watered by streams coming down from the adjacent hills.

ECOLOGICAL NOTES

For nomenclature see Contributions No. 13. It may be well to say that Merriam's Lower Sonoran is Tropical, his Upper Sonoran is Lower Temperate, and his Transition is Middle Temperate.

Practically all of my Texan trip was in the Tropical, which I did not get out of except a little in Huachuca Mountains, a small area west of Silver City, New Mexico, at Cloudcroft; and the region around Artesia and westward, which probably was Lower Temperate. Near Sonora, Texas, the crests of the hills show an influx of Lower Temperate, but there is no good zonal plant to use as a guide in that region, for the Juniper is surely J. occidentalis var. monosperma, and not Utahensis, and it is not subject to the zonal limitations of Utahensis.

In the June-July trip I did not get up into the upper zone in the Providence and Old Dad mountains. A little east of Hackberry, Arizona, the Lower Temperate comes in and continues nearly to Williams before it gives way to the Middle Temperate, which continues some ten miles east and north of Flagstaff, where it gives way to a wide belt of Lower Temperate which in turn transits to the Tropical at Cameron's and continues to House Rock. The lower slopes of the Kaibab are typical Lower Temperate, and

give way to the Middle Temperate which covers the bulk of the Kaibab, except on north slopes and tips of ridges which are Upper Temperate. Going north to Kanab we get down into the Lower Temperate and continue in that zone far upward toward the divide leading over to Glendale, and at and near Glendale we get in that zone again, and this zone continues up the Vergin many miles until it gradually fades into the Middle Temperate, which continues over the summit to and below Panguitch. Near Marysvale we get again into the Lower Temperate and continue in it to Salt Lake City.

West of Salt Lake City we are in the same zone to and beyond Wendover where we gradually get up into Middle Temperate on the summits we cross as far as Wells and Elko. North of Elko the vegetation is mostly Middle Temperate, but here and there are patches of the Lower Temperate in favored places toward the south. The Weiser region is all Middle Temperate, with practically no lower Temperate anywhere that is truly typical. This continues to Umatilla whose flora just borders on the Lower Temperate. The hills are all Middle Temperate with here and there patches of Upper Temperate. The Blue mountains and Wallowas go up into the Arctic or Alpine, which is also true of the Seven Devils mountains. Going south from Baker City to Winnemucca we gradually get out of the spruce (Upper Temperate), and down into the Middle Temperate to or near to Burns. From there south is a gradual transition to the Lower Temperate at Winnemucca and which continues to and beyond Wadsworth where there is another gradual transition to the Middle Temperate which covers the Tahoe region. In the latter region all the ridges and peaks go up into the Upper Temperate. Between Colfax and Auburn we get again into the Tropical and continue southward throughout.

NOTES AND NEW SPECIES

Cheilanthes Jonesii Maxon. It is unfortunate that this species was named after me. From all that I can learn it seems distinct from Notholaena tenera, and the rudiments of an indusium would place it in Cheilanthes. I was not the original discoverer. I should judge that J. E. Johnson of St. George, Utah, was the discoverer, some ten to twenty years before I got it at the place of discovery. I do not recall who called my attention to it. It might have been my old friend John Reading, or some one at St. George. The plant grows in the horizontal crevices of limestone rocks at the only water hole on the old road to the other side of the Beaver Dam mountains, some four or more miles west of Santa Clara City, Utah, and two miles farther from St. George. It is very rare, and has all the habits of a Pellaea. No one would ever take it for either a Cheilanthes or a Notholaena.

Bigelovia albida Jones. I was agreeably surprised to find this on the alkali flat just south of Denio, Oregon, about 165 miles north of Winnemucca. The type locality for this plant is Wells, Nevada. It has since been found by Hall in the Escalante desert, Utah, and by me at various

localities on the western side of the desert which marks the western edge of Lake Bonneville, in the region from Wendover south to east of Osceola, on alkaline flats.

THE PALMS

In commenting on the flowering of the palms I remarked last year that they had bloomed again here in cultivation, but did not set much fruit. The same trees have bloomed copiously again this year, in fact better than in 1928, and they will set fruit copiously again. But the past history of the palms is that they seldom fruit, as shown by the old peduncles still hanging on the trunks. The continued fruiting lately is certainly due to the unusual rains we have had. Yucca Whipplei bloomed again this year almost as copiously as before, but Mohavensis hardly bloomed at all, because of its remarkable blooming last year.

Agave Utahensis var. discreta n. var. Plants with the general habit of Utahensis and about ten feet high. Leaves subulate from a broad base and about 6 inches long, tapering into a stout spine an inch long, with margins smooth and straigh and with rudimentary prickles ¾ inch apart and with black base. Cross-section of leaves flatly triquetrous, leaves arcuate inward. Many peduncles several feet long, and ending in a very loose panicle with racemose rays rather distant as in applanata, and with flowers congested at the ends of the rays, and yellow, and not in an uninterrupted spike as in typical Utahensis, tube of perianth 1-2 lines long, and flowers not an inch long. Fruit not seen. Near the top of the divide above Oatman, Arizona, and along with Nolina Bigelovii.

Agave Utahensis var, scaphoidea (Greenman and Roush) A. scaphoidea Greenman and Roush. I cannot see any specific character in this proposed species.

Nolina Bigelovii (Torr.) Watson. The type locality of this species is Bill Williams river, western Arizona, which stream flows just south of the Chimihuevis Mt., Arizona, in other words just south of Oatman. I found this growing finely near the top of this range on which Oatman lies, on slopes in rocky places and continuing nearly to the foot of the range, Tropical life zone. The plant grows mostly in clumps though occasionally single stalks occur. They seldom have much of a trunk. The leaves are clustered in a fascicle at the top where the erect peduncle arises. The leaves are about 3 feet long and flat and not rough on the margins, an inch wide, and taper to a rather spinose tip, and the peduncle carries the magnificent panicle clear of the leaves, the panicle being much longer than the proper peduncle, and a compact lanceolate mass several feet long and tapering upward. The flowers are white, in a dense and spike-like raceme, 4-6 inches long, which is ascending and arises from the 1-2 foot long rays of the panicle. The flowers themselves are about 2mm. high and 4 mm. wide, with segments 2-3mm. long and oval-cup-shaped, acutish, very hyaline but with strong

midrib, and tissue-paper-like, and at last rotate spreading, being crowded out by the inflated ovary. The anthers on the pistillate flowers are ovate and on filaments flattened and about half as long as the floral segments. The ovary is crowned by almost sessile and minute spherical stigmas. Pedicels jointed below the middle and about ¼ inch long. The flower arise from a bracts are about as long as the floral segments fimbriate-lacerate above. bracts are about as long as the floral segments and fimbrine-lacerate above. Apparently the anthers of the pistillate flower are sterile. In the staminate plants there are no ovaries, the flowers are globose, nearly 2mm. long, ochroleucous and closed at first, and with segments more elliptical and with midribs scarcely visible. The anthers are versatile and oblong, 1 mm. long, and with faces vertical and facing inwards and opening into two discrete halves, and full of yellow powder. The pedicels of these flowers are jointed near the tip and about half as long as in the fertile flowers. I have no doubt that the stamens in the pistillate flowers become at times fertile, but I see no signs of it in the specimens gathered, and the plants are therefore dioecious, and 6-10 feet high.

Allium Haematochiton. As far as I can learn, all the southern Californian material referred to thi sspecies, outside of San Luis Obispo region is what Davidson has described as A. Marvini. It is true that Davidson founded his species in a white-tunicated form, supposing it to be distinct from the red-tunicated one, but in this he is in error. His species figured accords fairly well with our usual form except the white bulb scales. A. haematochiton is described as having a conspicuous rootstock, and purple flowers. A. Marvini has all the usual characters of the Cernuum group except that the peduncles are not nodding but erect and round in cross-section. Marvini has the periant segments oval-ovate and acute, about 5mm. long, white, rarely pinkish, with a green or bluish stripe at the tip on the outside. The ovary is truncate and with low crests running from the style to the base and spongy. The bulb scales are conspicuously ribbed by the meshes which are linear, usually 10 times as long as wide and with right-angled ends, though sometimes they are diamond-shaped on the same bulb scale, at the ends. Normally the bulb scales are brilliant red or purple, and very thin, and many. All the bulbs of this group grow in bunches, rarely single, and the collar is thick and long with several leaves which are long and tapering and very narrow, and there is no sign of a rootstick. The plants are usually about a foot high, growing in tufts on clayey slopes where there is a little seep of water in the spring. They grow only in the Tropical life zone, and bloom early, mostly in March. Davidson's type was got near Beaumont. It is frequent at Puddingstone Dam, near San Dimas.

Allium. The reticulatum group of this genus is very common in western Texas, growing on plains in open places. The group is characterized by the close and very fibrous coats of the ovate bulbs, with meshes close together. The bulbs propagate by division, mostly into two bulbs. A. Nuttallii (A. Helleri Small) is about a foot high and slender and without any but very minute central crests. The flowers are mostly white or pink and small. I

have it from Rock Springs, Texas, April 16, 1930; Ozona, April 13, Sonora, April 14; North of Del Rio, April 17, and at Del Rio. Shorter and less slender forms but crestless with slightly longer flowers arer from Rodeo, Arizona, April 8, 1930, Rock Springs, April 16, 1930, and Sierra Blanca. A. reticulatum differs only in the strong central crests and in being a little stouter. The flowers have a tendency to be bluish along the midrib, and the bulbs are often several in a cluster. I have it from Indian Hot Springs along the Rio Grande, April 30, 1930; Sierra Blanca, April 10, 1930; Del Rio, April 20, 1930, Lordsburg, N. M., May 5, 1930. The character separating this species from Nuttallii is only the crested ovary, a somewhat shaky one.

Allium Bigelovii Watson. This well marked species is less than six inches high from the bulb which is 2-3 inches deep in the ground. The leaf is single and arcuate but not flattened nor wide, and overtops the flowers. The umbels are large and about 20-flowered, with rather stout pedicels ¾ inch long, and with the white flowers with conspicuous and deep red midribs and tips, and segments about half an inch long and lance-ovate-acuminate. The crests are central, erect, petal-like and nearly as long as the capsules. The bulbs are globose-ovate, about an inch long and with deep reddish-brown outer coats separating readily. The bulbs propagate as in A. bisceptrum but without runners. The markings on the coats are well figured by Watson Bot. King, t. 38 f. 8 and 9. The walls of the meshes are a little uneven but not really sinuous as in A. bisceptrum. My figure 53a near tip is about the same, as given by me in Cont. 10. I found this only growing in the live oaks west of Silver City, N. M., May 5, 1930.

Allium Coryi n. Sp. Allied to reticulatum group. Growing on grassy plains at Alpine, Texas, April 26, 1930. Plants about six inches to a foot high, slender, erect, with 2-3 basal leaves half as long as peduncle which are very narrow and straight. Bulbs ovate, with very many yellowish-brown reticulated coats from which the very thin and hyaline membrane has disappeared leaving the meshwork only. Bulbs propagating by division as in Nuttallii. Sheaths of the umbels about as long as pedicels (1-2 inches). Pedicels slender. Flowers about 10, chrome-yellow, 3-5 mm. long, rather ovate. Perianth segments oblong-ovate triangular-acute, the outer ones with strong midrib. Ovary globose, crowned with thin and flat low crests on the angles. Odor alliaceous. One tries very hard to put this in Nothoscordium, but the bulbs and color are that of an onion. This is the only native yellow onion. Anthers elliptical, on fllaments nearly as long as the perianth. Dedicated to V. L. Cory of Sonora, Texas, an indefatigable botanist.

Nothoscordum Texanum N. Sp. Bulbs depressed-globose, about 2 inches wide when mature, of many hyaline and very thin coats onion-like, the markings being much like those figured in No. 52, second figure, in my Cont. 10. Below and at the base of the bulbs are produced one to several shining bulblets within the coats. The stems are 1 to 1 1-2 feet high and erect and slender and about as long as the very narrow leaves which are uniform in width and basal and about four. Bracts hyaline, about an inch long, two,

pedicels 1-2 inches long. Flowers about ten, half an inch long, whitish or yellowish or purplish, with green base and green nerves, with the erect perianth broadly linear and rounded at tip. Anthers broadly linear, on filaments about half as long as the perianth. Capsules about globose, 3 mm. long, low-crested. Bulbs deeply set in the ground, often about 6 inches deep. Rodeo, Arizona, April 8, 1930. On plains. Also at Del Rio.

Nothoscordum striatum Kunth. (N. bivalve (L) ?). What appears to be this species I have from Rock Springs, Texas, with small bulbs half an inch long and with smaller flowers.

Yucca. To me the treatment Trelease gave the Yucceae in his revision, after having gone over the ground carefully reveals a gross lack of discrimination. He founds the genus Samuela on the gamophyllous base of the perianth, and in doing so he shows lack of any careful study of the various species growing in the field over which he traveled. I have now carefully studied all the known species from California to central Texas. One of the first surprises was finding a most remarkable variation in the length of the base of the perianth. Years ago when I first studied Yucca baccata at Leeds, Utah, and Mohavensis at Mica Springs, Arizona, in 1894, the pear shaped flowers seemed characteristic with their long basal perianth. Then thirty years later when I again studied Mohavensis at Banning, I found the flowers often almost rotate but no other difference. An extensive examination of individuals soon revealed that the flowers varied greatly from pear-shaped. I found little variation in Yucca Whipplei in that regard though there was some variation. Then in 1929 I found the flowers of Y. elata much like those of Whipplei, none others being in bloom.

Sierra Blanca, Texas, was one of the localities specially visited by Trelease before he published his revision, and on the plants growing there he founds his genus Samuela with its two species. In the later part of April, 1930, I spent some time there trying to unravel the tangle made by Trelease. Back of the town to the west on the mountain are many scattered Yuccas of all ages and sizes, and many of them were in bloom. Trelease seems from my study of floral conditions there, to have selected extreme forms of Yucca on which to found his genus Samuela. On the mountains west of Sierra Blanca are a few trees about ten feet high, which conform well to his type species of the genus Samuela Carnerosana. These trees stand out from the Yucca rut as taller and with larger trunk, and with a short peduncle from half as long as the very long leaves to fully as long, and then the magnificent white panicle rises clear of the leaves in a rounded to ovate mass 2-3 feet long, and when fully mature has horizontal branches bearing several flowers. These flowers are very narrow, pear-shaped and drooping, and each branch of the panicle has magnificent and large white bracts. The flowers have a conspicuous tube. The apple-green leaves have the conspicuous fringe figured by Trelease. Taking these plants alone one would at once recognize the new genus as a good one. But when we come to study the area throughout and far down toward the Indian Hot Springs, many square miles of them, we find a very different condition,

that any acute field botanist would recognize at once. Normally the great panicles surpassing the leaves when in flower stand out as landmarks, but when you come to study all the vegetation you find many panicles among the leaves. Then you find leaves without the fringe, you find blue leaves either very thin or very rigid, and two to four feet long, almost flat or deeply sulcate. Then the flowers vary from typical to almost rotate and with or without a tube. You find flowers two inches and flowers four inches long. The whole pseudo-forest region seems to be a unit in its Yucca vegetation. You do find, here and there, a few Y. elata, but this species is not at all related to the edible-fruited Carnerosana. Now what is a person going to do? Use the Greene method of selecting aberrant forms to represent the new genus or to discard the whole as unscientific and revert Samuela to Yucca where it belongs. After seeing Trelease's type localities for his two species of Samuela, I do not hesitate to discard the whole thing at once as unwarranted. Trelease did not know the distribution of his proposed genus. I found it growing at the Colossal cave, Arizona, and in the Organ pass it passes imperceptibly into Yucca baccata. There seems to be a gradual intergradation from Yucca Schottii to the macrocarpa of the plains, and from that to Y. Mohavensis of California. I have already called attention to the interbreeding of Mohavensis with baccata. I have now been studying closely for seven years the various forms of Yucca and I find that Y. Mohavensis very often has the pear-shaped flowers of baccata though most of the forms have nearly rotate flowers. The panicles of Mohavensis are almost always sessile among the leaves, as are those of baccata, but baccata never has a trunk, while all the others have a trunk at maturity at least. There is no way to keep up the species of Yucca as interpreted by Trelease except to ignore all ecological facts and rest arbitrarily on variable characters. I cannot see any real distinction between Y. augustissima and elata, except the sesile inflorescence of the Utah forms. In central New Mexico and adjacent Arizona there is no telling the forms apart by the leaves. Trelease would put all forms of flowers of Y. Treculiana without manifest tube into Yucca, and those with tube into Samuela, but there is a gradual intergradation, and no possibility of separating them in the field, by any floral or vegetative character.

Calochortus Nutallii T. & G. on the banks of the Gila river near Silver City, N. M., May 4, 1930.

Sisyrinchium Arizonicum Rothr., Rock Springs, Texas, April 16, 1930.

Iris Missouriensis Nutt. Cloudcroft, N. M., May 2, 1930.

Nolina Texana Watson. Hope, N. M., May 2, 1930; Valentine, Texas, April 28, 1930.

Agave heteracantha Zucc. Hot Springs, Tex, April 24, 1930. This is very common on limestone areas along the Rio Grande, ocurring in great masses. It was just coming into bloom. The flowers are a very deep purple.

Nothoscordum striatum Kunth. Rock Springs, Texas, April 17, 1930. This appears to be quite common but was hardly in bloom.

Brodiaea capitata var. pauciflora Torr. Aquila, Arizona, April 4, 1930; Lordsburg, N. M., April 9, 1930.

Yucca macrocarpa Eng. Bot. Gaz. 6 224 1881. Plain near mouth of Ramsey Canon, Arizona, April 6, 1930. This is practically Samuela faxoniana Trel.

Yucca Schottii Eng. Ramsey Canon, Arizona, April 6, 1930. Leaves only.

Yucca caniliculata Hook. This is Samuela Carnerosana Trel. Y. Treculiana Carr. Sierra Blanca, Tex., April 11, 1930. A form nearer true caniliculata also from Sierra Blanca, April 11, 1930. A form about the same as Samuela Faxoniana from Indian Hot Springs, April 29, 1930. An intermediate form from Colossal Cave, Arizona, May 6, 1930. Also another form from east of Lordsburg, N. M., May 6, 1930.

Yucca rupicola Scheele. Devil's river, Texas, April 26, 1930.

In going east from the Needles, California, along the highway, I had a chance to make more notes on Yucca. Near Hackberry, which is near the upper limit of the Tropical, Yucca Mohavensis disappeared quite suddenly and Y. baccata came in strong and continues strong to the lower limit of the Middle Temperate near Williams, where it quit off suddenly and Y. angustissima came in and continued nearly to Williams. In its zone Y. Mohavensis rarely reaches 15 feet in height and had few stolons, and was in full fruit (June 15) and some pods being full sized. The fruit is spreading, or rarely fully pendent. It is rounded at the end and apiculate and about four inches long normally, though very often only two inches long and much stung by insects. When not stung there is no constriction in or near the middle. The leaves always have the Samuela fringe on the margins, the fringe being of coarse hairs. Those who are familiar with Trelease's figure of Samuela Carnerosana will know what I mena. The hairs on the margin of typical Samuela peel up in regular order and are about four inches long, arching backward. This is quite a conspicuous feature, but the regularity is subject to great variation, and often nearly disappears in some plants The leaves of Mohavensis are apple-green and normally 2 to 4 feet long, erect-spreading, straight and always channeled but not so deeply as in baccata. The panicle is rarely peduncled, a foot long, round to obovate or rarely oblanceolate, and a little exserted at tip (beyond the leaves). It is very common north of Amboy and continues nearly to the Needles, and is less common on the Arizona side to Hackberry. Some stemless forms simulate baccata in the blueness of the leaves.

On the other hand Yucca baccata is conspicuously caespitose with several stolons which very rarely have any trunk at all, though cases occur with stems two feet high. The leaves are inclined to be incurved at tip and nearly always arcuate, blue, with the same fringe as Mohavensis, much deeper channeled, and narrower normally. The panicle is linear, much fewer flowered, rarely oblonceolate, two feet long. The pods are conspicuously acuminate, about four inches long by two wide, and mostly pendent.

They should be fleshy when mature. The flowers are very narrowly pear-shaped, short-stiped, white with linear and blue-striped petals (perianth), with tips spreading. The stipe is ¼ inch long as in Samucla. The species can always be separated from Mohavensis by the pods.

Nolina Texana ? This comes in along the road in the upper edge of the juniper belt, west of Williams, on dry knolls. The panicles are 3 to 6 feet long and with short peducle at base, very different from N. Bigelovii at Oatman, which was also in full bloom.

Caulanthus annuus. N. Sp. Annuals, 2-3 feet high and erect. Racemosely branching above, and with the branches terminating in a naked raceme about a foot long in fruit, but flowers inclined to be capitate at first. All the leaves sessile and clasping but not perfoliate, entire, rounded at both ends, the lowest inclined to be obovate-elliptical, the middle ones elliptical-oblong and the uppermost ovate-elliptical, about 3 inches long, flat, the upper somewhat reduced, the internodes somewhat shorter than the leaves. Flowers bractless, narrow, nearly half an inch long, with linear and slightly saccate bases, and tips inclined to spread, and purplish, thin petals nearly white, flat, linear-spatulate, entire, a little longer than the sepals, very thin, and a little longer than the linear and sagittate and twisted anthers. Pods on stout and ascending pedicels half an inch long and which are 1-2 inches apart. Pods inclined to be tetrangular, 2mm. wide and 5-6 inches long, indifferently ascending, and rather lax, with a stout beak 1-2 mm. long, whole plant smooth. Leaves inclined to be palmately veined below. Growing in waste places on slopes in the pine forests. Middle Temperate life zone, above Canon City, Oregon. The plant has the habit of Streptanthus orbicularis.

Lepidium montanum Nutt. This species as usually understood is a hodge-podge. The type is described as having elliptical pods, which is a character of the plants growing around Grand Junction, Colorado, and which seem to pass into L. alyssoides and have a short style. The majority of the material from the north (Wyo. to Oregon) and south at least to central Utah, has cordate-ovate pods, reticulate pitted, distinctly stipitate, and with style half as long as the pod, and top of pedicel somewhat winged. This would come between L. Cradallii Rydberg and L. papilliferum (Hend.) Nels McB., both of which seem to be spurious species. It is unfortunate that we cannot use either proposed species as a variety of L. montanum, though Crandallii is nearer than the other but founded on a pod too long and without the rugose sides. L. papilliferum is described as having orbicular pods and short style. Now the form of this species (montanum) common in northern Nevada, is striking and quite different from typical montanum. There is a great variability in the length of style, from not longer than the notch to 1mm. long. But the same general habit, being a short-lived perennial. Collectors have confused forms of L. medium Greene with this species from the north. I doubt if any forms of alyssoides occur anywhere in the north, with which they have confused the same species (L. medium).

Stanleya annua N. Sp. No. 25317, Stems annual, erect, 2-4 feet high and simple, not angled nor winged, glauous and smooth throughout. Leaves

lanceolate and rather acuminate, apparently entire, 3-4 inches long, the lower auriculate clasping and the upper hastate clasping. Fruit i na long and simple raceme 1-3 feet long which is densely flowered with ascending fruit. Pedicels an inch long and filiform, with stipe nearly as long and ascending. Fruit about 2 inches long, by 2mm. wide, slightly torulose, laterally flattened, a little arched, ending in a short beak about 1-2 mm. long. Flower not seen. Frequent along the roadside at Huntington, Oregon, June 25, 1930. The species of Stanleya are described as perennials, but S. elata is a biennial, and this is clearly an annual.

Populus balsamifera L. In 1930 I had exceptional opportunity to study this species in the Wallowa mountains, Oregon. There can be no doubt of the specific identity of this and P. trichocarpa, the difference being only varietal. The tree has the same habit, the leaves are the same, the only difference lies in the hairy pod of trichocarpa, a character truly not specific.

Nolina Bigelovii was a conspicuous plant near the upper slopes of the mountain at Oatman on the eastern side, and reminded me of the magnificent Yucca Whipplei of our California slopes. The panicles were several feet long and rather golden yellow and wand-like and long stalked. I found both male and female plants in full bloom about the middle of June.

Astragalus fallax has the habit of Sileranus nearly and the same pubescence and grows on open mesas east of Williams, along with a Calochortus of the Nuttallii group. It is a little more erect than Sileranus and not with the same tendency to be trailing, but I incline to think the two species belong in the same group of the inflati.

Astragalus Cobrensis Gray. As shown in my revision of the genus this species is closely related to A. Brandegei. I had never seen it growing, nor did I know its habit or habitat. I got the species on the live oak hills west of Silver City, New Mexico, and found its habit just the same as that of Brandegei for it grows under and in the interspaces of the oak brush. The plants are perennial from deep-seated and thick roots which a few inches below the surface branch at the crown into innumerable filiform stems which do not root at the nodes, and which are often a foot long before they rise above the ground and form a tuft of leaves at the end. The proper stems in the air are a few inches long and erect or nearly so, and freely branch into slender and tortuous stems with terminal and short racemes of bluish flowers and few pods. The pods are narrowly oblong and blunt at both ends and triquetrous-cordate in cross-section and pendent. The plant was in fruit early in May, 1930.

Astragalus Thurberi Gray. This plant does not seem to have been collected very often, if at all, and is not mentioned by Coulter in the Flora of Texas, though it ought to be common in western Texas, nor by Standley in the Flora of New Mexico, though it is frequent throughout the southern part of the state, growing in the same situations as A. playanus, and often with it. It would be easy to confound it with small forms of playanus, but so far as I have seen it does not hybridize with it. I have one collection

that may be a hybrid but the pods are too small. I have often seen them growing side by side but without any sign of intergrading.

It is a short lived perennial, with many stems from the same root and spreading out to form a mat at times two feet in diameter, the central stems being erect. I was in error on page 102 of my monograph in saying that it grows in the Lower Temperate life zone, for it is found only in the Tropical. It abounds on sandy plains. My collection are east of Lordsburg, N. M., May 5, 1930. Foot of Ramsey Canon, Huachuca Mts., April 6, 1930. I saw it in several other places but did not collect it. Miss Eastwood also collected it at Silver City, New Mexico.

Astragalus allochrous Gray. This plant seems to include playanus Jones. At least I can find no permanent character to separate them, while there seems to be an intergradateion toward triflorus D. C. This plant is quite common on sandy places and on plains throughout southern Arizona and New Mexico. It is certainly a short-lived perennial blooming the first year.

Astragalus lentiginosus var. palans Jones. I very unexpectedly found this on the Papago Reservation west of Tucson, May 7, 1930.

Astragalus remulcus Jones. It is quite possible that this is too near Pephragmenus Jones, but the pods are too acute. The plant is manifestly near to argophyllus but I thing distinct from it because of the smaller flowers and habit. I have it from Silver City, N. M., May 4, 1930, just in the edge of the Tropical life zone.

Oxytropis nothoxys (Gray) Jones. I have this in exactly typical material from Texas Canon, near Dragoon, Arizona, May 6, 1930. It grows flat on the ground in fine gravel and is perennial. Mouth of Ramsey Canon, Arizona, April 6, 1930.

Astralagus didymocarpus H. & A., growing in sandy places 40 miles north of Tucson, Arizona, April 5, 1930.

Astragalus Nuttallianus D. C. I have this in half a dozen different forms but I do not think they deserve varietal rank. Sonora, Tex., Apr. 13, 1930; Rock Springs, Tex., Apr. 16, 1930; Sierra Blanca, Tex., Apr. 11, 1930.

Astragalus mollissimus Torr. Hope, N. M., May 2, 1930. This seems typical. It is a robust plant a foot and a half high, with large and purple flowers, and cylindrical pods arcuate somewhat and cross-nerved and sulcate at both sutures and linear-oblong and apiculate, rigid.

Astragalus giganteus Watson. This seems to be the same as the species recently described by Prof. Cory. I cannot see any valid distiction between this and A. mollissimus. The pod is broadly oblong instead of narrowly so, and the flowers are yellowish. Rydberg describes A. mollissimus as being "caespitose" but the plant is simply densely tufted like all the other allied species. The best that could be done with it would be to call it a variety of mollissimus. Ozona, Tex., Apr 13, 1930.

Astragalus Bigelovii Gray. This plant varies from mollissimus in the

pubescence being silky-woolly instead of appressed-hairy, and in the shaggy-hairy pods. Silver City, N. M., May 4, 1930. East of Lordsburg, N. M., May 5, 1930. These plants were low and widely spreading and with short peduncles. Ramsey Canon near the mouth, Apr. 6, 1930. These plants were tall, two feet high and mostly erect. This species seems to be more common than mollissimus.

Astragalus Earlei, Greene. This species looks like a small-fllowered form of Bigelovii with narrower pod (lance-oblong) and barely short-pubescent pods. The pubescence of the whole plant is short and dense. Alpine, Tex., Apr. 20, 1930; Marathon, Tex., Apr. 24, 1930.

Astragalus marcidus Greene. Whole plant softly shaggy-long-woolly even to the pods. Flowers small and purple in a dense and elongated spike. Pods depressed-globose and barely apiculate, 4-6 mm. long, concealed by the calyx. This is a counterpart to A. Matthewsii but the pods only about a quarter as large.

All these species lead one to think that the Mollissimi group is very variable and that the species are confluent.

Astragalus crassicarpus Nutt. Alpine, Tex., Apr. 26, 1930. This is a species with a single erect and thick root with a crown of many stems spreading in all directions, the lateral ones decumbent or prostrate in fruit. The pods vary from spherical to broadly oblong. This includes Rydberg's Geoprumnon succulentum and A. prunifer. The Texan plants are unusually small, but with the characteristic root.

Astragalus Plattensis Nutt. I should judge that this includes A. pachycarpus T. & G., which I referred to crassicarpus as a variety in my monograph. Torrey and Gray did not know anything about the root system of this plant, but the shape and character of the pod would place it with Plattensis. However the status of the species can be determined at once if it belongs to Plattensis, for this species is entirely different from crassicarpus whose root is single, fleshy and erect and with all the stems coming out from the crown. A. Plattensis however has no main root but sends out many underground rootstocks with branches in all directions and send up single and slender stems. The whole plant is softly woolly-hairy all over, and the globose-oblong pods are vertically flattened and sulcate ventrally and pubescent at first. The habit of the species is much the same as A. agrestis (hypoglottis). Ozona, Tex., growing with A. giganteus, on mesas among the oak brush.

Astragalus humistratus Gray. This is the white-pubescent early form which Wooton and Standley call albulus. Organ pass, N. M., May 3, 1930. Also on the Gila river, N. M., near Silver City, May 4, 1930; Lordsburg, N. M., May 5, 1930 and at Silver City, May 4, 1930.

Astragalus allochrous Gray. Localities where I got this are Organ Pass, N. M., May 3, 1930; Deming, N. M., Apr. 9, 1930; Lordsburg, N. M., May 5, 1930 and Apr. 9, 1930; Fort Davis, Apr. 28, 1930; Texas Canon,

Ariz., May 6, 1930. A possible hybrid with Thurberi is from Alpine, Tex., Apr. 26, 1930.

Astragalus sinuatus Piper Torr. Bull. 28 40. Considering the place of this species in the genus it was not properly described, nor would there be any means of determining whether it was a form of Gibbsii (where I referred it) or speirocarpus. The locality, however, "No 793 Brandegee, eastern Washington," would tend to tie it up with specimens got by me in Bruneau, Idaho, and Stein's mountain, Nevada, in 1930. In critical characters the description fails utterly. Then the absence of flowers in the type complicates things. The specimens collected by me show a very close relationship with A. speirocarpus. On the other hand no one seems to know for sure what are flowers of speirocarpus, or its exact habitat. In my revision I put speirocarpus in the group of Gibbsii and collinus with stubby ochroleucous flowers. If that reference is right then sinuatus is a good species, assuming of course that my material is A. sinuatus. Without repeating the characters given by Piper, I will say that the plants have the habit of A. fallax, that is they are erect spreading. The flowers are about the size, color and shape of A. cibarius, that is narrow and not at all stubby, but with broad and short wings, and purple, but the calyx is that of Gibsii. The pods are conspicuously laterally flattened and sharp-ridged, almost winged on the sutures, and coiled into a complete or double circle or sometimes not into a third of a circle, and are sharply cuspidate acumnate at very tip, pendent, and either softly and shortly woolly-pubescent or smooth, low-rugose, not inflated, opening along the stipe toward the tip at sutures. The pods are also mottled often. No doubt this species is intermediate between Gibsii and speirocarpus, but the flowers are conspicuously different. The calyx is inflated and yellowish, as in Gibbsii. A. speirocarpus is reported as growing on sand dunes in the region east of the Dalles. This plant grows indifferently on gravelly slopes or sandy areas. Since the localities in which this plant is found are so far apart, there will be no trouble in getting all its characters, but more study must be had on true speirocarpus.

Lupinus platanophilus N. Sp. Plants low and caespitose after the fashion of Lyalii, from a perennial root. Proper stems simple, rarely branched below, erect or spreading, rather thick and fleshy, with the nodes aggregated and the leaves clustered near the base, rarely over 6 inches high. Whole plant rather finely shaggy with loosely appressed and wavy hairs which are widely spreading on the filiform petioles. Petioles 4-6 inches long and spreading, with the base abruptly enlarged into a 10-nerved sheath which is about an inch long. Leaflets about 6, cuneate-obovate to oblanceolate, flat and apiculate, 1 to 1 1-2 inches long and nearly half as wide. Peduncles about 4 inches long. Flowers light purple, about 5mm. long, ascending on capillary pedicels about 4mm. long, with the silvery-hairy calyx deeply 2-cleft nearly to the base. Banner round and about 3 mm. long, abruptly recurved at calyx tips and purple-tipped, about 1 mm. shorter that the deltoid and very broad wings which cover it. Immature pods shaggy. The leaves are fleshy and hard to dry. The plants have the habit of L. concinnus. Grow-

ing under sycamore and alders on moist flats near the creek in Ramsey Canon, Huachuca Mts., Ariz., Apr. 6, 1930.

Chenopodium capillare N. Sp. A slender annual hardly a foot high, dichotomously branched from the base into a rounded mass about as wide as high, glaucous-green throughout and smooth except for dense scurf on the flowers and scattered on the young parts. The general appearance is that of Teloxys or Chenopodium botrys. The whole of the upper half is a mass of dichotomous pyramidal inflorescence, with the flowers about sessile in the forks and one to few there, and with the terminal one on a long and capillary (pseudo) pedicel 1 cm. long or less. Stamens apparently 1-2 and barely exserted. Flowers about 1 mm. wide and depressed-lenticular, with 5 oblong-ovate sepals very scurfy, which are spreading at maturity, or at least open somewhat. Seed single, lenticular, much flattened and with rounded and rugose edges, and dark, 1-2 mm. wide, with embryo coiled in a circle. Leaves lanceolate with cuneate base, on a capillary petiole not over half its length, barely an inch long. Leaves many. Growing in sand along with Abronia Crux-Maltae, etc. Carson Sink near Wadsworth, July 7, 1930.

Mentzelia acerosa N. Sp. Caespitose perennial from a thick and fleshy and erect root. Stems slender, much branched from the base, white-barked and bary densely white-pubescent, and stems closeset and tangled, very leafy throughout and with short internodes, particularly above, and becoming fascicled, and with the few flowers sessile among the leaves at the ends. Leaves 1-3 inches long, pinnately cleft to the base into 3-5 divisions which are subulate-acuminate into a sharp spine and very pubescent with very short and stiff and warty hairs spreading at right angles, with revolute margins and raised midrib, leaves sessile and thick. Flowers yellow, about 1 cm. long, with the 5 lanceolate petals sharply acute and hairy on the outside, and surpassed by the many stamens which have capillary filaments and oval anthers. Calyx lobes subulate and as long as the petals. Fruit ovate, about 5 mm. long, rough-hairy; seeds smooth, oblong, hardly 1 mm. long, apparently 3-angled and winged on the angles. Plants growing on bare clay hills near Bruneau, Idaho, June 23, 1930.

Phacelia Alvordensis N. Sp. Allied to distans. In the shade of bushes Salix and Prunus demissa, on the lower slopes of Stein's moutain, Oregon. July 5, 1930. Perennial apparently, with many stems 2-3 feet high straggling upward, but weak. Leaves thin and flabby, six inches or less long, the lower ones only petioled, pinnate into seven to ten distant leaflets sessile on the rachis, narrowly oblong and an inch or two long, acute and deeply cut into few deltoid teeth, sparsely and finely spreading-hairy and a little glutinous, but appearing as if almost glabrous. The stems softly and finely spreading hairy and glutinous, and terminating in one to several rounded and scorpioid racemes an inch or two long, the whole conspicuously yellowish-hairy with very long and slender setae 3-4 mm. long. Corolla barely surpassing the calyx lobes, a dirty-white, with the lobes rotately spreading and round. Filaments coiled and not so exserted, but much longer than the corolla which is about 6 mm. long. Calyx lobes very narrowly linear and

but little narrowed below, acute, very setose, twice as long as the oblong-ovate pods. Seeds elliptical, 1mm. long, acutish at both ends, conspicuously alveolate pitted, few.

Hymenopappus flavescens is described as biennial. It surely is a perennial.

Bahia depressa N. Sp. A low perennial a few inches high and much branched from the base, with short internodes and overlapping leaves which are about an inch long and spatulate and entire, and but little reduced above. Whole plant white-floccose even to the involucre. Heads terminal and lateral, on stout peduncles about as long as heads which are ½ inch high. Bracts of involucre oblong, erect and rather rigid, not spreading in fruit, with about 3 yellowish glands toward the tip (not visible except on looking through the bracts), forming a cup from which the ripened flowers fall. Rays several, yellow and about half as long as the heads, fertile and with the fruit inclined to be flattened and black. Pappus of about 5 scales tapering into denticulate awns as long as the body. Seeds appressed-pubescent. Growing on Cliffs near the Devil's river, Texas, April 22, 1930.

Stephanomeria minima N. Sp. A weak and widely spreading annual, divaricately much branched, a few inches high, leaves clustered at base mostly, the stem ones much reduced and bract-like. Basal leaves lanceolate and sharply and coarsely toothed, an inch or two long. Inflorescence cymosely branched with single heads at the nodes and which are about an inch long and pedicels bracted above the middle. Heads 4mm. long, smooth, light yellow, linear, with 4 linear bracts a little flaring at tip and purplish there, green, and with a single broad bract at base. Flowers 4. Akenes linear, truncate, not rugose but minutely roughened, with 4 strong ribs flattish on the top, each rib with a very thin and raised central line and with as minute single grooves on each side, yellow, pappus consists of a ring of white bristles, about 20 to 25 in number which are barbellate but not plumose, which come off from the akene in a body. Bristle about as long as the akenes, which are as long as the involucral bracts. Growing on the clayey plains at Fredonia, Arizona, June 1, 1929. This no doubt has been lumped in with S. exigua.

581.979
J72c
no.18

Contributions to Western Botany

No. 18

BIOLOGY

Marcus E. Jones, A. M.

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

Claremont, California

Issued Aug. 1933 - April 1935

BIOGRAPHICAL SKETCH OF PROF. JONES
BY MABEL JONES BROADDUS
STOCKTON, CALIF.

Return this book on or before the *Latest Date* stamped below. A charge is made on all overdue books.

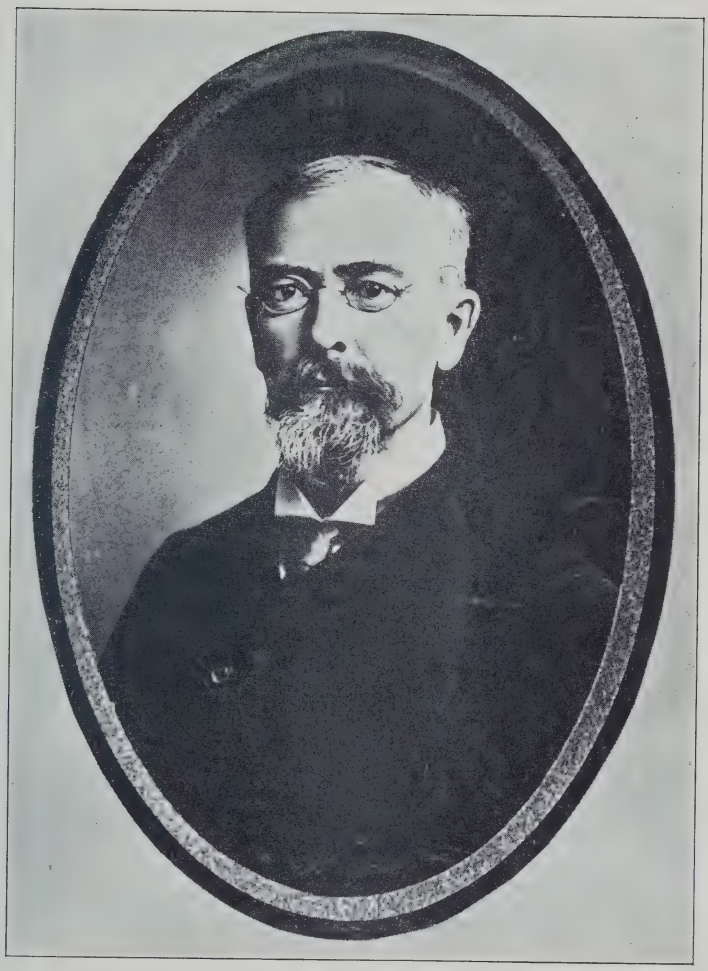
U. of I. Library

DEC 2. 1940

MAR 27 1950

JAN 9 1958

17625-S



MARCUS E. JONES, AT SIXTY

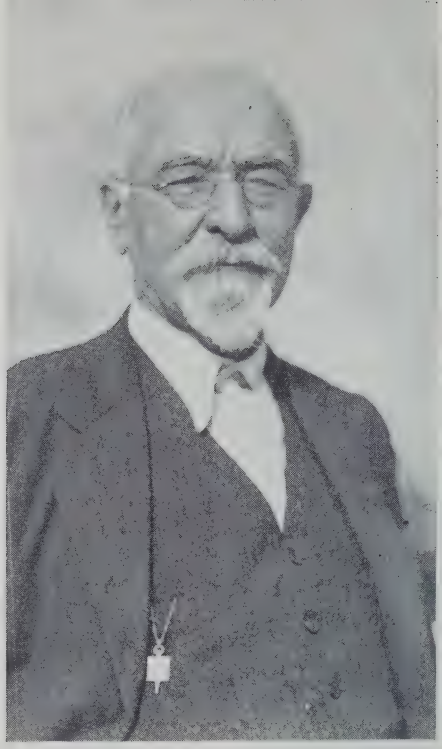


Photo by Ledyard, 1931

MARCUS E. JONES

MARCUS E. JONES ON SUMMIT OF McDOUGAL PEAK, MONT., WITH MISS GREEN AND MRS. JOSEPH CLEMENS

Botanists Whom I have Known.

With this issue I present the portraits of the botanists I have known, those worthy of consideration from my standpoint, and of others whose work has made them notorious.

I have also contended it is a botanical crime to use photos of men taken after they had ceased to be effective (in old age). No one cares to be presented in that condition, but necessity sometimes requires it when no other photo is available.

The three men and one woman, who stand out most prominently in Californian botany, have left no really good photos of themselves. There is but one indifferent photo of Brandegee and his wife, presented here. There is a fair one of Parish, also presented here. There is but one photo of myself that I would ever care to represent me, but my friends prefer the older one, both given here. Several others have been printed in various papers and magazines, but none of them were satisfactory to me. As a concession to my friends, I give the latter also.

There are good photos of Gray and Watson available, but I have found none of Nuttall, Pursh, Michaux, Kellogg, Rose, Coulter, or Bessey. I did not know Nuttall or the earlier botanists. Kellogg was the third, mentioned above.

Determinative Evolution.

In a recent issue of Science, vol. 74 p. 559, Osborn of the N.Y. Nat. Hist. Museum, broaches this subject a kind of discovery of the laws in the case. W. A. Noyes and W. A. Margenau, same vol. pp. 595-6 take exception to Compton's suggestion along the same line ("The Uncertainty Principle") in chemistry. Osborn says that there has been creative ("determinative") evolution in animals and heralds it as new in science. In 1923, in my revision of Astragalus, I brought out the fact that evolution is due to stress of ecological conditions in forcing plants to develop along lines favorable to the perpetuity of each species. In "Fundamentalism", published soon after that, I brought out the fact of determinative evolution by finite agencies (not human). The term creative evolution (Osborn) is a very vague one, which assumes the existence of an external power directing plant development. This whole subject is not at all new, in fact, older than Christianity. It has been held for ages that God created all things. But the great question now is "What kind of a god was it ?" The student of plant breeding finds that plants, under stress of certain conditions "sport" in all directions, like a blind man feeling his way, and not only in lines tending toward the perpetuation of the species, as should occur if under the direction of the Christians' omnipotent and omniscient God. We would expect that He would not produce a thousand seeds in order to get one to grow, and that He would get rid of abortive organs when they have ceased to function, and that we would not have the tremendous biological scandal of the desert turtle living one hundred thousand years with his useless shell on his back and where there is no water.

Evolution in Nature, as we find it in operation, shows about the intelligence of a ten year-old child. That there is mind is self-evident to me, but not the omniscient mind of my childhood days. The smart Aleck religionists will criticise me for daring to find fault with the Creator. A Creator with horse sense would not object to honest criticism, none others need be feared. That stupidity reigns everywhere in Nature is a self-evident fact to a man with his eyes open.

Burbank would plant ten acres of some special kind of plant and at maturity, out of the hundreds of thousands of individuals he would select those having the characters he was breeding for, a very few individuals, and he was supposed to be a great plant raiser because in twenty years he got such wonderful results. But Burbank was not much of a scientist, for had he used the known factors in plant development he would have got the same results in half the time. ~~It is a well-known fact that plants growing under~~

factors in plant development he would have got the same results in half the time. It is a well-known fact that plants growing in alkaline soil develop thick and fleshy leaves and reduced flowers, and those growing in acid soil develop thin and broad leaves and large flowers. Many other equally important factors were known to plant breeders and are used by them in producing new plants, but, with it all, we are continually confronted with the factor of sporting along senseless lines, in our attempt to explain natural processes rationally. The mentally lazy theologian will clasp his pious hands and ejaculate "What God hath wrought is past finding out", but the scientist demands to know. Those who claim the creative mind behind evolution point to the exceptional and not the common things as showing super-human intelligence, such as the development of the ear and the nervous system, and the blood circulation in animals. If they would consider the common exhibitions of intelligence in animals, such as the absence of group protection in whales (so conspicuously present in monkeys and peccaries), the wonderful wasp intelligence in paralyzing food and making nests for their larvæ, and neglecting simple precaution against fly-blowing their prey, showing that everywhere in Nature stupidity prevails in the propagation and preservation of living forms.

I confess to a confusion of mind in trying to recognize anything new in Osborn's "Six Principles of the New Concept" The only new thing is the statemet. His use of borrowed Greek may seem learned, but to me it is camouflage.

I agree with Noyes and Margenau that photosynthesis as an uncertainty principle is an empty one, for it is subject to rigid chemical laws and is uncertain simply because of its complexity, just as the synthesis of the animal and vegetal hydrocarbons is uncertain because of their various responses to catalysts and temperatures. But the more care is taken to keep conditions normal, the more these complex forms are resolved.

There is no doubt in my own mind that by proper control of conditions much of the sporting of living forms can be controlled, and the development of new forms can be hastened and directed, but at last analysis we are up against some form of determinative evolution. In the event of a perfect understanding of all growing conditions we may find a quantitive law behind it all, but I seriously doubt that we can ever find a quantatitve explanation for life. Gray put it well when he said that evolution can account for the preservation but not for its origin.

That Nature is dough in the hands of Man is a well-known fact. How else can we account for the wonderful development of sugarcane, bananas, and seedless citrus fruits, all of which are incapable of self-propagation?

Some people forget some facts about animals. It is the gen-

eral belief among geologists that the great reptiles and mammals of the Tertiary and earlier ages became topheavy by over-development and have about faded out now, there being only a few waifs left, such as the elephants, rhinoceros, hippopotamus, tigers, lions and whales.

A conspicuous illustration of a biological misfit is the Cactaceæ, a family of horrid armament and wonderful floral development, specially adapted to possess the Earth but so handicapped by weak productive organs and inability to adjust itself to humid conditions that it cannot become a menace. The religionist will point this out as a special provision of an all-wise Creator, but the scientist will reply that if He were all-wise He would not have let such an emergency arise, ~~but~~ To him it is simply a case of a family carried away by a craze for floral and spine development to the detriment of self-propagation.

H. M. Hall.

H. M. Hall. The recent death of this promising young botanist is greatly deplored. It was his misfortune to be employed by Clements in his early botanical work, in which he seemed constrained to adopt some of that erratic botanist's foolish terminology. Clement's familiarity with his mother tongue was so poor, and his seeming knowledge of Greek so great that young men were hoodooed into falling into line with him, adopting his terminology as the most up-to-date thing in research, when in fact it was nothing but a grandstand bluff. When an American has to go back a thousand years to properly express his ideas we suspect ~~to find~~ a screw loose in his anatomy.

Hall's work on the San Jacinto mts. is a painstaking piece of work, and had he gone into it under proper direction he could unravel the tangle made by Merriam. His ideas on specific limitation were nearly right, but he set the example for a mass of foolish splitting in the species by giving names to varieties and forms as subspecies and subgenera, which others have followed supposing it was a new discovery instead of a piece of pure bunk.

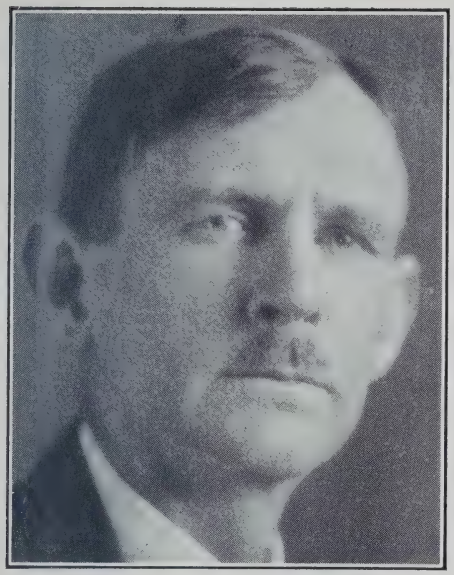
His revisions of Bigelovia and Aplopappus (under othor names) were good. It was amusing to see him try to resurrect Haplopappus. Doubtless he was led into it by his "linguistic" superior, but had either of them been at all familiar with Greek they would have known that there is no letter "h" in Greek, for it was not considered worthy of litteral rank, just being a rough breathing, used or discarded according to the whim of the user, just as the English of today aspirate or de-aspirate initial vowels, much to our amusement. For example, they would spell saloon with a "hess", a "hay", a "hell", two "hoes", and a "hen".

The founder of the genus, Cassini, chose to write it Aplopappus, and it remained so till Endlicher, the hair-splitter, tried to correct it, but the botanical world has ignored him.

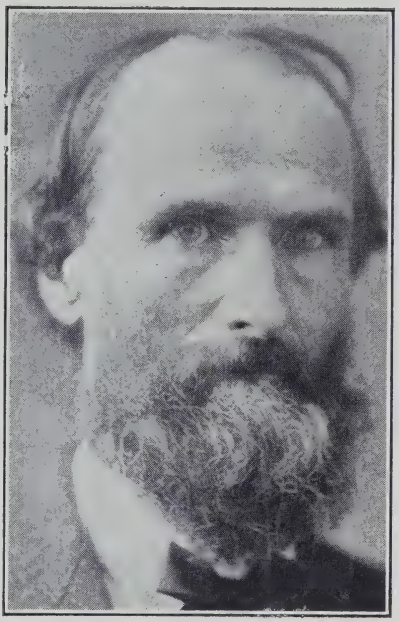
Judge Ben Johnson.

The greatest penalty I know, for getting old, is to live to see those we love pass out into the great Unknown. Ben, ~~was~~ one of the younger sons of J. E. Johnson, of St. George Utah, whose name will always be remembered in early botanizing in Utah, has gone. Ben was his father's companion when he scoured the hills for the beautiful and new species of plants that made his father famous. Though born in polygamy Ben early abandoned Mormonism, married and moved to Salt Lake City, where he practiced law as his profession till death. He became judge of the municipal court, and later on clerk in the state library, compiling the laws.

When in middle life he contracted tuberculosis, and for years hung between life and death, finally winning out, but the struggle left his lungs so weak that a bad spell of weather took him off. Only three days before he was stricken I had a fine visit with him and his wife, and I warned him againt exposure, but he laughed it off. All his spare time was spent in his garden, raising rare plants or settling problems on obscure ones. He always had a fund of new things to discuss every time I visited my old home, and the visit was not complete till we had met. Ben was in constant correspondence with Burbank and other big growers, even in Europe. He also grew the best gladiolus, iris, tulips, lilies, and other show plants for the trade. He was a very successful grower of plants, and his whole soul was absorbed in the work. When I bade him a last goodby he seemed as well or better than ever, and liable to outlive me many years. There is no-one left to continue his work and his loss is irreparable.

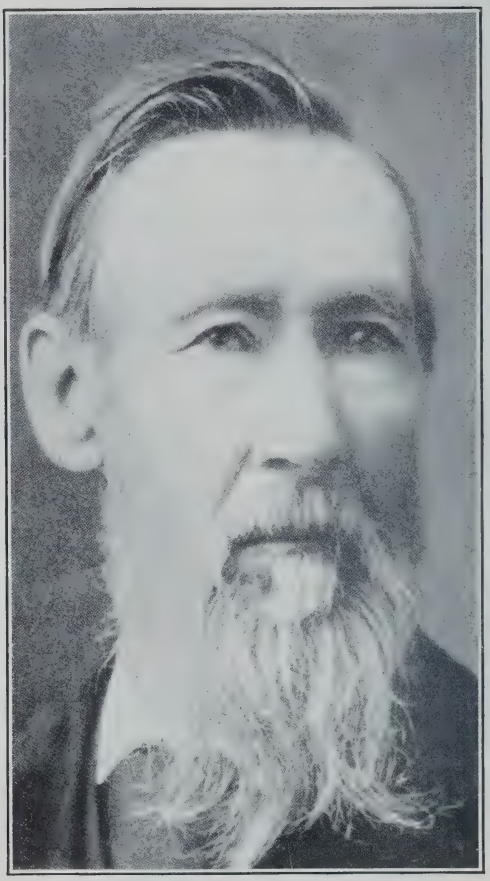


JUDGE BEN. JOHNSON

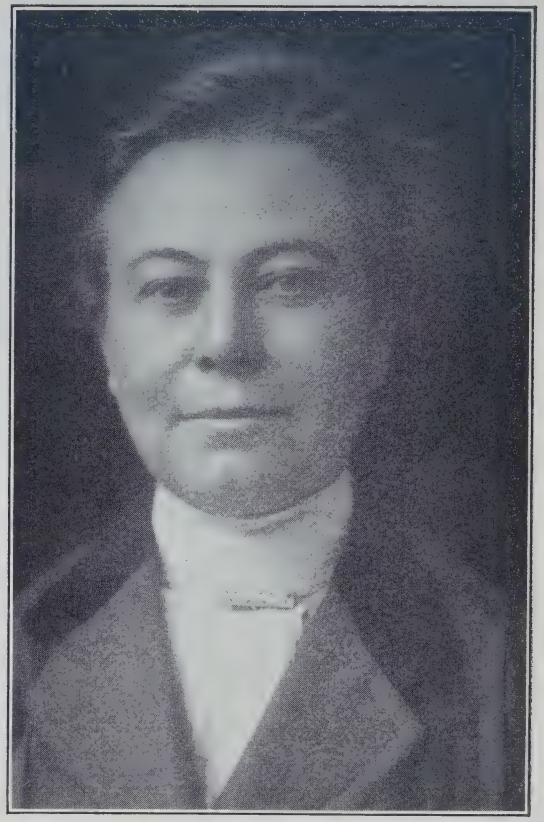


J. E. JOHNSON

C. F. BAKER



DR. GEORGE VASEY



ALICE EASTWOOD

ERYTHEA LORETENSIS N. SP.

C. F. Baker.

Baker undoubtedly was the most indefatigable and the most prolific botanist in America. He cannot be said to have been in any sense a model botanist for he burnt life's candle at both ends and thereby killed himself when he should have been in his prime.

He had no sense of obligation to his body, but rode it to death, often working all night, as well as day, to deliver some promised consignment. Once he and his wife labeled and put up 6000 insects in one night, for he was also an entomologist.

I never met him but he began sending me things to name, and then stopped. I never knew why till I began to see new species published by Greene from the same collection. Recently, in Berkeley in talking to his former associates, I found that he admitted that the sale of his sets depended on the number of novelties in them. So he had them determined by the man who could see the most novelties in them, and Greene stood at the top, for he could see them where they did not exist. To me that kind of work is infamous.

Baker was what I would call a good botanical collector, but a sloppy scientist, for his work was not done scientifically. He made no effort to know each species as it grew, all its varying forms. So they have little value ecologically. Botanizing should be an honest attempt to know the flora as it is, and not a wild scramble to make a few extra dollars selling alleged novelties.

Alice Eastwood.

I present here the portrait of Miss Eastwood, (following my announced plan of using photos of such in their prime,) who is first in being the most indefatigable woman in America. There are few botanists who know of the herculean task she set for herself, and simply for the love of it, the remaking of the herbarium of the California Academy of Science, which was destroyed by the earthquake. That herbarium ranked first in the West as the depository of the types of Californian plants.

I do not take much stock in hunches. they are often hallucinations, but Miss Eastwood had a hunch that she should collect all the types in the herbarium, and it soon became an obsession, and she obeyed it. When the great quake came it did not destroy the building but did break the water mains and so made the great fire possible ~~and~~ which soon reduced everything to ashes. Immediately after the quake she hurried to the Academy and carried off the precious types. Since then she has given her life to rebuild the herbarium, working early and late, going everywhere, suffering any inconvenience and loss of time and money, just so the herbarium benefited. When I inspected the new library and rows of new cases filled with botanical specimens I took off my hat in reverence. Her work, like mine, is mostly done, and the falling leaves will soon obscure our graves, but it will be many a day before botanists will cease to venerate her magnificent work for the Academy. I have known her for a generation, and we have worked over the same field, but I have found her too big for jealosies and petty squabbles, which have disgraced a certain envious critic.

She is always helpful and generons, to a fault. The other day she accused me of saying she " is honest and a lady always" (see Cont. 13 p. 74). I plead guilty, and could say more.

W. L. Jepson as a Botanical Editor.

In what the young folks of today would call the wild and woolly past it was axiomatic editorially to be truthful, fair and interesting: now the only requirement seems to be "make a story". The result is that scientists shun reporters as they would snakes for the average reporter shows the intelligence of a twelve-year-old child. Jepson seems to regard this class as ideal.

I have several times called attention to his lapses and exhibitions of personal spites, such as his unjust criticism of Miss Eastwood (see my Cont 13 p. 74), his slap at Mrs. Brandegee in his mushy review of Greene, and his general unfairness toward brother botanists. But I never noticed exhibitions of actual viciousness till my attention was called (July 4th. 1932) to Madrona vol.1 p. 218 July 1929, in which he publishes a letter of Parry's written in 1882.

The facts in that case published in an April number of 1882 of the San Diego Union, and in my Cont. 17, are as follows: I accidentally met Parry at the hotel, and he told me that Pringle was there, and he suggested that we three form a party to explore Mexico, so I agreed. Parry and I hired a team and buggy of the widow Orcutt, and her son Charley as cook and driver. Charley soon became offensively insubordinate and had to be called to time.

On our return from Ensenada we reached Tiajuana Saturday night. I had never traveled nor collected on Sunday, and so did not want to go in the next day, but for reason of "urgent business" Parry could not wait, but promised if I would let him and Charley go in he would send Charley right back with the team. I did not discover, for some time, what Parry's hurry was about till the Botanical Gazette came out with my new rose with a new name by the "high minded" botanical thief Parry.

So they left Sunday morning, but Charley did not return till Wednesday, and had his older brother, a man about my own age, with him. Their conduct, on their arrival, indicated no good to me and so I refurbished an old pistol that I carried, and strapped it on me and went out and hitched up the team. At this juncture the brother sprang to the bits of the horses and told me I could not drive the team, I exhibited the pistol and told him to get, and he got in a hurry, for he would have been shot if he had not. Mexico was lawless then and is not much better now.

Below is Jepson's alleged account of the same incident, over his signature. There was nothing in Parry's letter about the incident but Jepson lugs in the following in a footnote, as follows:

"On this expedition there was collected large amount of new material which has become classical. The majordomo of the pa

ty was H. C. Orcutt of San Diego, assisted by his son C. R. Orcutt. Here it is that the younger Orcutt acquired, under the influence of Dr. Parry, an interest in collecting plants and turned plant collector for life. Another member of the party was C. G. Pringle, a prince of plant-collectors, whose name was well-known to botanists everywhere".

"The Orcutts were Sabbattarians and when it came the Lordsday they proposed, as a matter of course, that neither man nor beast should should travel. A fifth member of the party drew a gun and forced the Orcutts to proceed. It i sunnecessary to say that neither the high-minded Parry nor the considerate and friendly Pringle had anything to do with this coercion". (Slobber)

Of course neither Parry nor Pringle had any part in it for Pringle was out on the desert and the "high-minded" Parry was in San Diego stealing my new rose (R. minutifolia).

Now the query is What was Jepson's motive in going back 47 years to resurrect an old letter so that he could knock a man not mentioned in the letter, and whom Jepson is too cowardly to name

Let me play Sherlock Holmes. It happened(?) that my extended criticism of Jepson's flora was published a month before this effusion of Jepson's exuded. In that criticism I cited many glaring errors and could have cited many more. It would not have been at all out of my way to have laid bare his reputation among us for he has alienated most of his clientele by his selfishness. I have felt, however, that since he has announced an intention to write a flora of California he is entitled to the field, and have criticised as piracy Abrams' attempt to enter the same field, but when Jepson resorts to bald-faced lying and distortion of facts to make a case one's patience with him becomes strained.

Orcutt's father was dead therefore was not a member nor the majordomo of the party. Pringle at that time was not known for he had not botanized in Mexico. The Orcutts were not Sabbattarians and had no scruples about Sunday travel. When the Orcutts tried to force me I used my gun rather than use my fists in a losing battle against the two men.

Douglas and Annual Rings.

During the summer of 1931 Douglas, of the Carnegie Inst. at Tucson, was reported in the newspapers as saying that the annual rings of trees and shrubs are true indices of the years elapsed while they were being formed, and on this basis he made an elaborate summary of the time since certain cliff dwellings were built.

If Mr. Douglas is a botanist of even ordinary education and experience in the southwest he knows that the statement is a falsehood. I have no sympathy with the idea that the public likes to be humbugged and deceived, particularly in scientific matters, so commonly done today in California in one of our prominent colleges

Scientific men look with some allowance on talks to general audiences where there is manifest stuffing of the facts, though even this is pernicious, but this kind of whooping it up for the Carnegie Institute by MacDougal in the guise of Douglas should have a crimp put in it. It is not generally known that MacDougal is a pastmastor in the use of hot air, wind, and star chamber proceedings, a fact that I discovered when I was Secretary of the Utah meeting of the A. A. S.

North of lat. 42° annual rings are fairly indicative of the age of trees if properly interpreted, but south of that in California, Arizona, New Mexico, and western Texas they are almost worthless unless corrected by independent data. The reason for this is that region has a Tropical climate, has no real winter, Tucson being near the border line. This area has little or no frost, but in its place a wet and a so-called dry season, where the lowest growing temperature (about 43°) is seldom reached, and for this reason vegetation will start whenever there is enough moisture. In the area in question there is a great mixup so that there is often enough rainfall in the spring to bring the trees into leaf, to my own knowledge this has been the case for the past nine years, and therefore to make an "annual" ring. Then when everything dries up in the hot months and takes a rest till the rainy season begins, vegetation makes a new start and a new ring on the trees.

For this reason there are two rings a year, and it is a misnomer to call them annual rings. There is another complication. There have been two years in the last nine when over a part of the area there was no rain in the fall, and so no ring was formed. The desert is notorious for its spotty rainfall.

Now knowing these facts what is the sense in going before a gaping world and chattering in terms of years about the age of the cliff-dwellers?.

Mrs. T. S. Brandegee.

In these sketches of botanists whom I have known it must not be assumed that I am attempting biographies, my aim is to mirror to you the person as he appeared to me, and in an unvarnished light, for I abhor slobber, and the petty lying that passes under the cloak of diplomacy (see Jepson's reviews of the work of Greene and others).

Mrs. Brandegee was Kate (Katherine) Layne, the oldest in a family of five children. Susan was next, like Kate, a husky and red-blooded woman of tireless energy, who married Mr. Stockton and bore him nine children, and lived and died at Ramona where her son still lives. Sophronia was next who died young. Then Alfred the cripple was next and he also died early. The last was Tom, who left home early and all record of him is lost.

It is recorded that the Laynes were of the Bolling stock, as was Brandegee himself. It seems to be a law of nature that brainy people come from brainy stock.

The first record of the family is of their being in Salt Lake City in the great gold rush to California, in the forties. Mrs. Layne was a talented weaver, and her husband an irascible schoolteacher. They were short of funds, and so the wife got work at weaving and was so proficient that Brigham Young tried to have them remain and become Mormons. They did stay a year, and then moved on to Carson City Nevada, where Kate was born.

To some people to grow up in the electric atmosphere of the greatest mining camp in the world would stimulate even sluggish minds to do their best, but persons like the Layne girls would be set on fire. I myself was there when the great Comstock, only a few miles away was booming (in the eighties) and you could not miss the thrill of those glorious days. No doubt to be born and raised in such environment had much to do with Kate's mental growth. Those were the beginning of the caliper age, the age of precision, when things had to measure up to standard, in distinc- from the happy-go-lucky days before.

It is evident that the home life was not pleasant, because of the father's violent temper, and because of the early death of the mother. The two older girls were so self-contained that they often fought in hair-pulling scraps, and yet to the end they dearly loved eachother and corresponded to the end of life.

The two girls were almost opposites. Susan was very affec-

MR. AND MRS. T. S. BRANDEGEE

DR. GEORGE ENGELMANN

tionate, a home lover, a good housekeeper, an observer of the conventions, a good mother, and a devout Christian. Kate was at all times an uncompromising rebel. Her sister sometimes ch ded her for the way she kept house and for her dress, but she would tolerate no other way. To demand that she should conform to any custom meant war to her. She interfered with no ones affair and demanded the same freedom for herself. She was always self-contained and asked no favors. She was more masculine in her attitude toward the world than any woman I ever knew, and less offensively so. I know several old maids who have fried, and boiled, and roasted man every time they open their mouths, cant feel right till they have knocked the men, doubtless because the men have offended their vanity by ignoring them.

So far as my relations with her were concerned Mrs. Brandegee never attempted to dominate me in anything, and if she had she might have received the same answer that one of our local women got who attempted it. I let her talk till she got out of breath (generally two and a half minutes) and when she was drawing for the next wheeze I turned to her sharply and said "When a woman tries to razz me I tell her to go to Hell". She shut up so tight that it took her an hour to get her mouth open and she has been very docile ever since. No one is more kindly to women than I so long as they keep their places.

It is uncertain whether the family remained in Nevada long enough for the children to become of school age, for they moved to the west of the Sierras, and there Kate became a school teacher and during this time she fell in love with an Irish-Catholic by the name of Curran, she herself never was religious. They lived together for a time, but he became, or was, a drunkard and she had to go back to teaching or starve. This ended in a separation, but Kate never lost her affection for him, but doctored him up when sick, and buried him when dead, and in spite of her poverty she paid all of his bills, most of which were for drink. She seemed to consider him an unfortunate. I noticed the same attitude in her reaction toward her second husband in certain things that would make most women furious. This tolerant attitude toward us as though we were half savages is quite agreeable to some men, but we do not require any such treatment, for self-control is the glory of men. I am convinced that the savage reaction toward me when I said to her "You owe it to the world to let us have the story of your life", and she savagely turned to me and bitterly replied "What does the world care for me ?", was the cry of a wounded heart, of one longing for recognition long over-due.

To me such an attitude is childish, the Bible puts it well in saying " If thou faint in time of adversity thy strength is small."

We all have periods of feeling unappreciated. How can it be otherwise ? We bury ourselves in our shells and expect others to dig us out, but they are too busy with their own struggles. The only reward worth having is the consciousness that we have been honest with the truth and done our work well. Then we are exempt from the devilish, cowardly. pussyfooting element always whispering in our ears the sordid things of self-interest, that poison all good. It is no discredit that Kate's soul cried out in anguish at the world's indifference. We are all human.

It appears that with all her struggle against poverty and a drone of a husband Kate took a complete medical course, doubtless to the better her care for her "unfortunate" husband. She never discovered her wonderful mental equipment that made this possible but just went ahead and did things in spite of all handicaps. One of the things that impressed me most was her perfect memory of contemporary botanical literature, for she was familiar with the writings of all our botanists from the earliest times till now, a herculean task in itself. It is probable that she began her botanical studies under Greene in the late eighties and because of her talent became his assistant. She was indefatigable both in the field and herbarium, and early began pnblishing valuable things such as identifications of Kellogg's new species which relegated some of Gray's names to synonymy, a daring thing in those days. There were many problems of distribution to settle requiring much traveling and research, till she became a walking encyclopedia on California botany.

It will be well to recall that Greene was an Episcopalian minister at Silver City New Mexico when his name was prominent in Gray's publications on western botany, along with many others, such as Lemmon, Howell, Cusick, and myself. He moved to Berkeley as pastor there. Before long his social vices caused his unfrocking. He then became a rabid Catholic. It was at this time that he was elected professor of botany at the state University. Mrs. Curran was Greene's assistant for some years, and during that time Greene proposed naming an Astragalus for her as A. Curranae, but in a letter she objected, saying she was born a Layne, Curran, an acquired name which she might not retain, but she, later on, did not object to Anemia Brandegeae by Davenport.

After a time we find her the curator of the herbarium of the California Academy of Science,following the death of Dr, Kellogg. That this was caused by a flareup with Greene was evident for when I first met Greene at Berkeley he referred to her as a "she devil", the women were always his nemeses, and she soon after got his dismissal. As a rule when woman have difficulties with men hey are vicious, but she never made any comment on Greene when

with me. She knew that I had called his Eschscholtzia work "botanical drivel".

Since she was irreligious, one would expect to hear her rant against, as most scoffers do, but, though she held nothing sacred, she was scrupulously honest even in her thinking. For example, Miss Eastwood began browsing in my field, the Navajo Basin, and collected several species that I had discovered years before and not described because of the incipient ruction with Gray, but now that Gray was dead, there was no occasion for delay and so I began, by request from Zoe, to publish new species. Among these was Verbesina scaposa. On reading my MS. Mrs. Brandegee thought my species was the same as Miss Eastwood's Encelia nutans, so to protect Miss E. she printed her article first, without consulting me. Many botanists would have been sore over it for I was the discoverer of the species, and the only right Miss E. had was priority in submission of MS. I had sense enough not to be angered by it and it never was mentioned. Most editors would have suppressed Miss Eastwood's species, but not she. Her course wss the only one and 1 doubt if Miss E. knew of it. Such sterling fairness is rare.

You would not expect much precision in a chronic female rebel, but Mrs. Brandegee was a model in thoroughness in her botanical work, and she put the herbarium on a sound basis both in the mounting and arrangement of specimens. She was the author of the wellnigh universal method of mounting specimens, which I would not tolerate if I controlled a herbarium. The gluing of specimens directly on the sheets, instead of by stickers is ruinous

It was opportune that Brandegee came to California at this time with a lot of Columbia Basin and north Pacific plants to name, for he was the oldest and most accomplished botanist in the country, and his presence would command respect and dispel the aura that Greene had cast about himself as a human god. Brandegee never squabbled. He was a very insignificant looking and little man who did not have to blow about himself (like Greene) to be heard. The atmosphere cleared at once, and everyone saw the beginning of a new era. Mrs. Curran fell "insanely in love" with Brandegee, as she put it in a letter to her sister. It surely was a droll affair, a most intensely masculine woman desperately in love with the most retiring and effeminate man, and both of them dead in earnest about it, the man too with other women buzzing around like flies in fly-time.

It was at this time that Brandegee had a legacy of $40,000. So they married, and if there ever was a pair of marital chums they were it. She never dominated him for he would not tolerate such a thing. She was not a worshiper of any man. But she knew her place and kept it, a thing that few women do.

The stimulus of being united to a man with the commanding intelleet of Brandegee was just the necessary tonic his wife needed and she began systematic research to settle the status of all the Calfornian plants. No one seems to know her motive behind it all whether it was just the satisfaction of settling problems, like her husband, but we all hoped she would publish a flora of California.

Neither she nor her husband were ecological botanists, nor have I found any other systematic Californian botanist who knows anything worth mentioning on the subject, they just tag along behind Merriam like a flock following a bell-wether. Hall was the only one to attempt to be original, and he confused drainage areas and ecology. Neither Brandegee nor his wife ever tried to get the entire flora of any region. Such a thing as combing a region for everything in it never seems to have occurred to them.

This is why I found so many species of plants in Lower California that Brandegee missed. No doubt he saw them as I did, but his attention was focussed differently.

It was not long after their marriage when the Brandegees began "Zoe", the only highclass magazine on the Pacific Coast. It was evidently intended to be a biological one, but zoologists and botanists are like water and oil, they dont mix, and so the zoological part died a-borning.

Mrs. Brandegee was the inspiration and the force behind "Zoe", and she did a remarkable piece of editing and proof-reading, and all without previous experience or training. Her capacity for critical work was shown by her masterly handling of Greene's proposed new species and genera. It was a coldblooded presentation of the facts, without bias, and colorless so that no one would ever suppose that it was a woman that wrote it. There was no reply possible, and all Greene could do was to call her names privately, which he proceeded to do. Greene's position was that. since he was an ordained minister, any attack on his acts was a sin against God, and the act was therefore devilish. Doubtlesss this was the cause of his hatred for those whom he could not use. I have found this attitude the prevailing one among ministers, though generally camouflaged by specious verbiage.

Mrs. Brandegee was specially interested in the genera messed over by Greene because she had worked on them with him before the split. These, among others, were Gilia, Eritrichium, and Californian genera in general. Her conclusions were the result of exhaustive study, and this caution was the cause of the chaotic condition of her work when she died for her memory was so good that little was put down in writing, and when the hand of death struck all was lost.

Knowing Mrs. Brandgee at her best, as I did, by days of the most critical conference, I am prepared to say that she was the greatest woman botanist that ever lived, a genuine genius for research. I have known two such men, one a philosopher, the other a business man. Her worst sin was excessive caution, which led her to put off publication too long. We could do without ninety percent of the published stuff and not miss it, but not hers. All her interest, in later years, centered in botany, except for a series of futile experiments to solve the riddle of sex.

No one who attempts to publish a botanical magazine for the love of it has any conception of the slow, and lingering death involved. All the mental carrion birds swoop down from the oblivion to which Nature has assigned them, and croak at your every issue, poisoning your policy, without anything wholesome in its place. Such people are a constant eyesore for their business is to croak. When the Brandegees appealed to me to continue "Zoe" I did not have on my martyrial robes, in fact had lost them years before, by other martyrdoms. The discontinuance of the journal was the end of her publications as such, though she may have overseen her husband's issues.

The extra leisure she now enjoyed enabled her to go east to inspect types. For two generations western botanists have been exasperated by the relics of the Linnæan slogan that no description shall contain more than ten words. This stupid fad had led Gray and Watson to make fools of themselves in describing western plants, so that we could not be sure of our names till we had seen the types in the east, for the identifications of those men were not always reliable.

So she started east, and made her first stop with me in Salt Lake City where she went over many of my types, spending some days discussing various systematic problems with me. Then she started east and got as far as St. Louis when her infirmity (diabetes) became violent and she had to go home at once. Being a doctor she knew that to be at home was her only salvation. A few years after she tried it again, and nearly died before she got home. It seems that she got worse rapidly and died soon. She was convinced that there was no hope, and yet in the face of death made no effort to put her botanical house in order. I can understand why because she felt she owed the world nothing. To one like myself who believes that our first duty is to make the world better for our having lived in it, this seems a crime.

It was said of Mrs. Brandegee that she was beautiful in her early days, but I doubt it because of angularity, she may have been handsome, but too angular for beauty, but as I remember her she was erect, showing her age (over seventy) only in her long gray and unkempt hair, and angularity. She had on a mother-

Hubbard calico dress, old leather slippers and no stockings, and her long gray hair hanging in stringlets down her shoulders. In most cases like this women so caught would flutter around and ask to be excused to dress up for a stranger like me, but not she.

Ne apologies were necessary, I was not there to see her clothes, though men usually take in everything visible. 1 stepped up to her and said "Mrs. Brandegee ? I am Jones." All social matters vanished and we began on botany. It was a botanical paradise, rare flowers blooming on all sides, mockingbirds, quail calling, and other native songbirds making the air musical with song. I spoke of it to her and she agreed with me, but said the climate did not suit her health and they were too far from libraries, and they were going back north.

She then took me into the brick herbarium and showed me the library and botanical material, and introduced me to Brandegee.

This was my first meeting with them.

About all the femininity there was about her was her long hair and dress. Her face was a powerful one without suggesting dominance, which instantly rouses my antagonism. It was a judicial face, and all her conversation was the weighing of the evidence of the validity of species of plants. There is but one other woman that I know who has the natural capacity of Mrs. Brandegee, but she has not yet found herself.

1 shall never get over the feeling that it was a monumental sin for her to die when she did. There was no excuse for it. She was a doctor and knew that the first law of Nature is self-preservation but all her life she treated her body shabbily, and at the climax of her life, when she should have been at her best she was snuffed out like a candle iu the wind. Everyone owes it to himself to do for his body all that is necessary to keep it in perfect health, and must not abuse it by demanding more of it than it can do, but many of us who had to struggle with poverty, and endured all sorts of hardships and privations to win our places in the world do not always observe the laws of health, and though she is long-suffering Nature makes us pay the price, and the cost to us sometimes is terrible. No-one who neglects his body has any valid excuse. I know for in my boyhood days I became aware that I inherited certain tendencies and weaknesses that would take me off before my majority, but since life was dear to me I became an athlete and worked out of me all the harmful germs, so that now at eighty I could run a footrace with men twenty years younger or climb a mountain with men forty years younger than I.

In "Desert" I have written more about Mrs. Brandegee.

Neopringlea.

In his Shrubs and Trees of Mexico, Standley, in a footnote, p 706, says the following: "perhaps the best known and most industrious of north American botanical collectors (Pringle) It has been estimated that during his 35 years of field work he distributed to the herbaria of the world over 500,000 specimens." I do not want to detract a jot from my friend Pringle's reputation, but he himself would not tolerate any such gross misrepresentation. As an "industrious" botanist Pringle did not compare with C. F. Baker, and he never distributed half as many specimens as I have. Standley is always going off at half cock.

Where Pringle shone was in the unequaled quality of his specimens, and for this very reason he was not a good field botanist. No one can be who is fussy about the quality of his material. He never would collect a species unless the material was just right, and so he failed to get many desirable things, so that though he botanized at and near Guadalajara, Mexico for nine years I got over twenty new species there in 1930. If he had done good work no such thing would be possible.

W. N. Suksdorf.

At this writing (October 1932) there comes news of the death of Suksdorf, by being run over by a train he was trying to board. It seems he was 82 years old and crippled by rheumatism so that he did not get off the track soon enough after flagging the train.

He recently made himself odious by publishing 100 new species carved out of Amsinckia intermedia, a-la-Greene. He never seemed to have discovered that Greene and Rydberg are botanically dead. One would expect to find more sense than that in a field botanist, but some people are hard to convince without a club.

Suksdorf lived in the Columbia Basin most of his life, and also was, for a time, an assistant of Gray at Harvard. He was always a hopeless splitter.

Abrams's Floras.

In my criticism of Abrams's botanical work in my Contributions No. 15 I did not discriminate between the two floras, but my objections were chiefly to the second edition of the Los Angeles flora. His larger work camouflaged under the title of Pacific coast flora is a piece of botanical piracy violating the ethics of the profession. I hold no brief for Jepson, but even he has some rights which decent people are bound to respect.

NEW SPECIES AND NOTES.

Allium Elmendorfi n. sp.

No. 29071. Elmendorf, Tex. Apr. 3 1932. This has been confused much with A. scaposum Bth. of the Sierra Madres of Mexico. Stems slender, delicate, erect, 6-12 inches high, growing in clumps, with 3-4 linear and very slender leaves half as long as the stems, and erect from very long and hyaline sheaths 3-4 inches long. Bulbs ovate, ½-3½ inches long, and becoming oblate by the production of many oval and acute bulblets from the base and within the outer bulb-coats Bulblets all stipitate on a stalk 1-6mm long, about 5 mm. long and whitish. The two outer bulb-coats rather thick and brownish, with very irregular transversely-rectangular meshes with very finely tortuous walls, as in A. Palmeri. Then come several papery, white and very thin coats with very faintly-linear and vertical meshes with smooth (not tortuous) walls.

It is well to say here that the special (marked) coats have a central and mostly thicker part with the peculiar markings (see my Contributions No. 8, figures) and closely investing it on each side is an excessively thin subsidiary coat or lining with faint and vertical meshes. Sometimes these coats separate from the special one but their markings have no significance. rarely they are so dense as to obscure the central one as in A. fimbriatum. Sometimes there are more than two between the special ones, as in this case.

Umbels small, 10-15 flowered, with two ovate and hyaline bracts over half as long as the pedicels. Pedicels ½-1 inch long, lax.

Flowers white, with the ends of the perianth inclined to be red on the nerves. Segments oblong to ovate, obtuse and very thin.

Stamens included. Crests apparently none. This corresponds fairly well with scaposum except the markings of the bulb coats

Bulbs not splitting in age. It is very likely that this has been mistaken for scaposum or Palmeri. The bulb coats of Palmeri are thicker and do not slip up on the stems as these do, and there are not the long and hyaline sheaths or papery inner bulb scales. I have scaposum from the Sierra Madres of Chihuahua, near Hartweg's type locality, and it is not this same species.

Allium mutabile Mx. No. 29072 from below Laredo Tex. and 29073 from Kingsville Tex., both in 1932. It is evident that this species needs more information about it. The two characters that seem to hold are the very thin and hyaline perianth and the very coarse reticulations of the bulb coats which are evident on all the outer coats to the very base. In addition the bulbs are often an inch in diameter. The perianth segments are also rarely 6 mm. long. Another character that seems valuable is in the production of bulblets at the base of the main bulb as in the species above. A. Nuttallii and reticulatum do not reproduce by bulblets but by fission of the main bulb.

Allium Nuttallii Watson No. 29076, Eagle Pass Tex., 29077 Beeville Tex. and 29078 Winterhaven Tex.

Tillandsia Baileyi Rose, No. 29079 Port Isabel Tex. This is about the type locality. It is described as having the leaves covered with a "scurf" below. This consists of innumerable concave and hyaline disks with black centers, about ½ mm. diam., overlapping eachother. It seems to be a good species.

Schœnocaulon Drummondii Gray, No. 29080, Beeville Tex. This is described as having fibrous hairy bulbs. The bulb coats are fibrous at top but hyaline-tunicated below and very thin and onion-like, and with very many vertical and slender ribs 1-3 mm. apart, and the rest of the tunic very finely and vertically striate-veine with narrow, transverse and rectangular meshes. Bulbs often 2-3 inches wide aud 6 inches long, and deep-seated. Leaves very finely striate-veined with raised ribs.

Allium reticulatum var. ecristatum n. var.

No. 29074 Beeville Tex. Ovaries crestless. Plants about a foot high and slender, with 2-4 leaves which are a little shorter than the stems. Bulbs ovate, barely an inch long, white, propagating by fission; with brown, evenly and finely reticulated coats which are not solidified below. Pedicels 1-1½ inches long. Flowers 10-15, about 6 mm. long, with segments lanceolate-acuminate, equaling the stamens and strongly pink-ribbed. This grows in large areas at Beeville. Plants which I have referred to Nuttallii but are reticulatum are nos. 25980, 25978 and 25981.

Thelypodium Tularense n. sp.

Tulare Cal. March 10 1032, on the plains. This belongs to the laciniatum and lasiophyllum group with flat petals, too close to Sisymbrium. Strictly erect annual, with lanceolate, laciniate and toothed leaves with tapering petioles and no auricles, leafy up to the short and bractless racemes. Flowers yellowish-white, about 4 mm. long, with broad petals. Pods filiform, variously kinked, finally reflexed, about 2 inches long by 1 mm. wide, not angled but torulose, sessile, acuminate into the short style. The stems unbranched.

Encelia lineariloba n.sp.

No. 29410. Laredo Tex. March 23 1932. A much branched and erect and slender shrub, 2-3 feet high, growing on embankment by the side of the road, also gathered at Dryden in 1931. Leaves laciniately dissected into 2-3 pairs of linear-acuminate divisions, 1-2 inches long, with revolute margins ashy-white below with minute hairs. Leaves 2-3 inches long and nearly sessile, alternate,

very many. Heads single and terminal on long peduncles, leafy bracted below, rather depressed-globose, half an inch wide, with many linear and closely pressed rough bracts about as long as the short flowers. Rays many, yellow, fully half an inch long. The akenes truncate, smooth, quadrangular, slightly larger above. Pappus none.

Brickellia Shineri n. sp.

No. 29411, on the Sabino river Mex., 80 miles west of Laredo Tex., March 26 1932. Plants growing in tufts about 3 ft. high and erect but with many spreading branches above. Whole plant rather glutinous, short-hairy, green, weak, leafy. Leaves cordate-ovate, 2-3 inches long (exclusive of petiole), shortly-acute, thin, somewhat doubly and coarsely or laciniately toothed, teeth few, abruptly contracted at base into a deltoid area which ends in a slightly winged and filiform petiole about as long as the blade, minutely hairy and with petiole very hairy with kinked and spreading and flat hairs. Branches and stems equally hairy. Plants throughout appearing as if glutinous. Stems ending in small clusters of few heads on short and filiform peduncles. Bracts lanceolate and acuminate into needle-like tips, rather imbricated and passing into those on the stems. Heads not pendulous, 6-8 mm. long, white flowered, less than 10-flowered. Akenes 5-angled, black, slightly pilose, about 4-5 mm. long. Pappus white and sparse. Growing in the woods. This has the general appearance of B. grandiflora but leaves not at all acuminate, and heads smaller. Dedicated to Mr. Shiner, an enthusiastic botanist of Laredo who accompanied me on the trip and also enabled me to get many rare plants in the region.

Tradescantia Texensis n. sp.

Growing in moist places along creeks and often with T. scopulorum at Roosevelt and between Kerrville and San Antonio Tex. Stout, erect and tall plants, entirely smooth throughout. Stems rather nodose at the joints, with few and short branches. Upper leaves ovate, 2-3 inches long, short-acuminate, the lower ones inclined to be linear-acuminate from a broad base. Flowers few, in a dense umbel, about half an inch long. with narrowly elliptical sepals.

Rhus Florita n. sp.

Florita mts. New Mex. Sept. 7 1903, Jones. No. 86113 Pomona Herb. Leaflets linear, apiculate to barely acute, smooth, sessile, with the rachis conspicuously winged. Evidently near to R copallina.

In the following descriptions of mostly Mexican plants, for saving space details of locations are omitted and given here below as follows: Cabo is San Luis del Cabo, 14 miles east of cape St. Lucas Lower California, Sept. 14 and 15 1930.

The Borrego and Pelota ranches are in the foothills of the La guna mts. Lower Cal. The Cayuca and Arroyo Undo and Primiera Agua ranches are in the Sierra Gigantas west of Loreto. The Laguna is the prairie in the top of the Laguna mts., lower temperate life zone, Triunfo is 44 miles south of La Paz, and Cacachilla mts 20 miles south, all in L. Cal. Guadalajara Jalisco is the city, and LaBarranca is 5 miles southwest of it, and Orendain 20 miles northeast of it.

Selaginella barrancae n. sp.

La barranca Guadalajara Jalisco, Nov. 25 1930. Growing loosely matted, in moist places in the shade. Leaves flat, almost round, about 2 mm. long, smooth, slightly imbricated at least above, marginless and mostly blunt, but some of the upper white-apiculate the forming fertile spikes seemingly short and with imbricated and apiculate leaves. This would at first suggest S. saccarata, but leaves decidedly different.

Pellæa intromarginalis, of authors. Judging from herbarium material, there is a great variation in it. In young fronds the indusium is beautifully fringed and lacerate, and in older ones it is split up as in Cheilanthes. In Manzanillo material of my own collecting, the sides of the pinnules are strongly serrate, but in my Guadalajara material they are without a trace of serration, and the sporangia extend out beyond the indusium like a fringe of hairs. The fronds are conspicuously vein-ribbed as in some Aneimias. The spores are black and globose.

Polypodium Scouleri H. & G. Jepson, Man. 29, says this has ovate fronds with oblong pinnæ. I find the fronds are normally lanceolate, and rarely ovate, and from a few inches to a foot long, and with stalks as long as the fronds. The freshly ripe fruit dots are lemon-yellow, very large and in age becoming blackish. The pinnæ are rarely oblong, but normally nsrrowly oblong to almost linear and obtuse and very obscurely and obtusely dentate. The root scales are the same as in P. Californicum, that is, chestnut-colored and subulate-triangular and papillose, aud ending in a thread, and shining. The plants form large colonies where possible, on horizontal branches of evergreens, sometimes going almost to the tops of tall trees, and then again being small and stunted on rocks or near the ground. This plant's home is in the fog-soaked areas along north-California coast in dense forests from near Eureka and northward, but grows sporadically as far south as Santa Cruz island.

Lomaria spicant Desv. Jepson l. c. 34 says "Leaves erect" (meaning sterile ones). I find the sterile ones are normally flat on the ground, while the fertile ones are strictly erect from a central tuft.

Pinus monophylla Eng. The type of this species has entire and single leaves, rather long-acuminate, normally 3 inches long. Engelmann, when describing it, mentions the fact of its having 2 leaves also, and says that the seeds of the type are larger. This has led some botanists to call the 2-leaved forms edulis, but that species does not have single leaves at any time, while all trees west of Colorado have some single leaves among tha rest. There is no character of value in the difference of size of cones or seeds nor in habit or size of trees, for there is a variance of 50%. The Great Plateau plants usually have longer leaves than true edulis, but rigidity is what keeps this group distinct from the cembroides class. I see no way to keep up edulis as a species, and many years ago I proposed the name P. monophylla var edulis, Zoe 2 251 1891

Pinus edulis Eng. This has been reported from the San Jacinto mts. and in Lower California, but I doubt its existence within 500 miles east of there. Everything seen so far is the monophylla form. I have never seen the true monophylla till last year at Frazier Park, near Lebec, which is really on the desert slope, where all the trees are typical 1-leaved forms. These trees will average a little bigger than the usual desert forms because of higher humidity.

Juniperus. The species of this genus are in a hopeless state of confusion, due to such closet botanists as Sargent. The chief trouble has been in the occidentalis gronp, and is assumed to contain Mexicana. Engelmann clearly places this with the big and red fruited Californica, and has slender branches and squarrose scales. What the Texan botanists call this species has blue and small fruit and must belong to the occidentalis group. This has been chopped up, on trivial characters, into three times as many species as exist.

Paspalum tenuissimum n. sp.

27584, on the prairie at the laguna, Laguna mts. L. Calif., lower temperate life zone, 6500 ft. alt., and along the down trail, Sept. 22 1930. Plants barely 6 inches high, and with the filiform stems in small tufts an inch or a little more wide, as if stoloniferous, but apparently not so, in granite gravel along with Bouteloua oligostachya, etc. Leaves clustered at the base, from short and broad sheaths, the blades 1-3 inches long and about 1 mm. wide. Whole plant smooth. Stems 3-5-times as long as the leaves and threadlike, and leafless above the base, terminated by a single falcate spike about 3 inches long by 1 mm. wide. Flowers ashy-roughened, without glumes. The large palet appearing as if enwrapping the very narrow upper one, linear-lanceolate, 2mm. long and acuminate, and with a wide and rigid white midrib on a very dark ground. It is strange that Brandegee and Goldman did not get this very common grass on the Laguna mesa.

Cyperus Guadalajaranus n. sp.

No. 27603, Guadalajara, Mex., Nov. 26 1930. Plant apparently near C. Gatesii Torr., and with the habit of aristatus. Filiform annual, a few inches high and erect, and with relatively broad leaves shorter than the filiform stems. Spikes capitate at the ends of the stems, 20-50 in a head, and sessile or nearly so, sometimes with capillary rays one to few bearing smaller heads. Spikes .5-1 inch long by 2 mm. wide, straight, a little tapering, brilliant-chestnut colored, flat, with the scales about 1 mm. long, and with very prominent and green mid-nerve ending in a short and rather recurved awn, with a single nerve. Flowers rather deciduous. Seeds triquetrous and about half as long as scales.

Cyperus aristatus var perennis n. var.

A densely tufted perennial growing on the Laguna mesa along with Paspalum n. sp. Stems and leaves about equal in length. Flowers rarely more than 10. Scales uncinate. Plants about 4 inches high. No. 27595, Laguna mts. L. Cal., Sept 22 1930.

Cyperus Barrancae n. sp.

No. 27601a, La Barranca, Guadalajara, Jalisco Mex., Nov. 23 1930. Plants near C. Surinamensis Rottb. Whole plant smooth, erect, perennial, with elongated and narrow leaves. Heads yellowish, linear, about an inch long, congested at the ends of unequal and mostly short rays, but with 10-15 heads sessile on very short secondary rays. Flowers early deciduous and leaving the conspicuous, chestnut-colored, serrate, and capillary rachis appearing as if a pedicel. Bracts ovate, obtuse, or barely apiculate, with only the central nerve or a trace of a lateral one, smooth, about 1 mm. long. Flowers about 50, in an arcuate head.

Fuirena Primiera n. sp.

No. 27604, Primiera Agua near Loreto L. Cal., Oct. 19 1930. Erect perennials, leafy to the top, and with all leaves having short sheaths, linear-acuminate, 1-4 inches long by half an inch wide, smooth and striate or the lower ones ciliate, glaucous. Heads sessile in terminal clusters, much resembling Scirpus maritimus, oblong-ovate and acute, about half an inch long, very densely flowered. Scales oval, emarginate or abruptly contracted into a stout and white awn half their length, margins hyaline and lacerate and softly and very minutely hairy. Akenes minute, triquetrous, shining-yellow and sharp-edged, strongly apiculate by a stout style. growing in water in a little pond and along a ditch. This is likely the same as got by Brandegee at Comondu not far away.

Eleocharis capitata R. Br. 27606, Primiera Agua near Loreto L. Cal., and 27597, Borrego ranch. Laguna mts. L. Cal.

Carex Lagunensis n. sp.

No, 27592 The Laguna Laguna mts. L- Cal. Sept. 22 1930 on dry mesa in dense tufts, about a foot high. Stems strongly striate and sharply triangular, filiform, leafy below but surpassing the narrow leaves which are 1-2 mm. wide. Heads about 4, aggregated, erect, sessile, ovate to oblong, 6-8 mm. long. Bracts scale-like, the lowest only prolonged into an aristiform tip 1 cm. long. Scales oval-o-ovate shortly acuminate tip almost as long as the akenes, chestnut colored and with strong and green mid-nerve, and narrow, white and hyaline ma.gins. Akenes very flat-lenticular, green, ascending, compactly packed, 3.5 mm. long, oval-ovate, little wider than the scales taper-beaked, rather strongly 1-nerved and with faint laterals, strongly flat-winged and hispidulous on the margins, the oval seed occupying about half the width and length of the akene. the akenes remind one of the straminea group, though much smaller, Plants related to C. illota

Carex longissima n. sp.

No. 27594, growing in clefts of rocks on the trail down the Lagunas, in dense tufts, about the lower edge of the Middle Temperate life zone. Stems and leaves thread-like and nearly equal. Spike single and terminal, abont 3 inches long by 2mm. wide, chestnut colored, flexuous, pistillate on the lower third, very dense above with imbricated and triangular scales about 4mm. long aud closely packed, the pistillate scales a little wider below and inclined to be awn-pointed and nearly twice as long as the oblong and lenticular and rounded and pubescent and nerveless akene which is closely appressed and abruptly contracted into a round beak half as long as the body, the whole 3 mm. long, scattered, early deciduous.

The Palms.

In my former Contributions I have tried to clear up the confusion about the generic identity of Erythea and Washingtonia. No character giveu by Watson can hold I have visited the regions in which they grow wild and have checked up on the myriads in cultivation, and find certain errors. Brandegee was an accurate observer and seldom erred, but he speaks of Erythea Brandegei as common in the Lagunas, but I searched for the pipestemmed species there in vain, Washingtonia is everywhere but the other is absent.

When not in bloom they are hard to distinguish, but the fluttering of leaf-segments of W. Sonoræ in the constant wind at the Cape and the green leaves and white strap-like bracts of Sonoræ should identify it. Now our knowledge of Erythea is from cultivation. but the genus is known from such plants mostly as E. edulis and armata and growing in the wild. They are such slow-growers that they are not favored by dealers, but seeds are widely scattered, and the craze for growing palms still persists among newcomers. Fifty years ago seeds of edulis were planted in California hen came Washingtonia and armata, then elegans- came from So

nora and grown by Mr. Rock at San Jose. So far there is but E. aculeata Brandegee left, but not cultivated. Watson's characterization of Erythea was a failure. I have sought good generic ones that will hold. The floral character that I suggested falls down. for the flowers are so small that the segments seem united but are not in fact so. No character has any distinguishing value except those of floral bracts and seeds. The bracts of both genera are split down one side from the tip, but produced only in Washingtonia into a long, white and strap-shaped blade, but in Erythea they are very short. The seeds of the former are very small, rarely .5inch long by .25 wide, oval-oblong, and round in cross-section and sulcate ventrally. Seeds (fruits) of Erythea are about spherical when fresh, but the seeds when stripped are oblique flattened on the chalaza end, and in E. Loretensis are lozenge-shaped, but 3-5 times as large and never oblong in outline. The outer pulp of Washingtonia is black when ripe and should be sweet and edible like the date, and at maturity peels off the seeds easily. The outer covering of Erythea is pulpy and reddish in all the species before maturity, but edulis and Loretensis are black when ripe, and appear almost spherical, but the seeds vary, in edulis they are not much different, the seeds are about globose and rough, but are lenticular and much obcompressed and shiny-black in Loretensis, but the pulp is as thick and as edible, but the fruit is a half smaller. E. elegans and aculeata are dwarfs in all probability, leaving armata and Brandegei as the only remaining trees. armata has glaucous leaves which make it seem blue, and has long and whip-like peduncles and linear panicles long-exserted and twice as long as the leaves, but Brandegei has green leaves and included panicles the pulp pithy and reddish as in armata also. The panicles and fruits of aculeata are described by Brandegee as like edulis.
Seeds of elegans are not "pyramidal", as described by Beccari, anb fruits nearly spherical, and the panicle linear. as in armata, but coming out near the top and erect, not drooping as in armata E. elegans and aculeata have prickly petioles as in armata and the leaves persist for years and are not selfpruning as in edulis, and the fruits about the same size and shape as in armata.

ERYTHEA KEY.

(This is to replace the one offered in Cont, 15p 53)

Panicles not exserted nor narrow, ovate, not interrupted.
Leaves green. Friuit black, with juicy and edible exterior pulp. Fruits about spherical
Fruits 2 cm. wide and with seeds nearly round.
Leaves unarmed, inclined to be deciduous 1 E. edulis

Leaves armed, persistent. 2 E. aculeata
Fruits not over 1.5 cm. wide. Seeds lozenge-shaped
3 E. Loretensis
Fruits reddish, not over 1 cm. wide. Petioles flattened. Leaves armed. 4 E. Brandegei
Panicles exserted, linear, interrupted. Fruits reddish, about 1.5 cm. wide, not edible. Leaves glaucous.
Panicles erect. Dwarfs 5 E. elegans
Panicles drooping and elongated.
6 E. armata

Tht there is some doubt concerning E. elegans is shown by the letter of Beccari to Mr. Wright of Riverside, reproduced here.

"Florence, Royal Museo, Via Romana 19

My Dear Mr. Wright.

On my return to Florence I have examined the fruits you sent me, under the name of Erythea elegans Franchesi, and to tell you the truth they resemble those of E. armata, at least they correspond exactly to all the fruits which I have received with this latter name. The fruits of Erythea elegans which Dr. Franchesi himself sent me have a form distinctly pyriform. If you cultivate as E. elegans the plant which produces the fruits which you have sent me, I would be curious to see your E. armata.

Nov. 8 1911"

"Notes on Erythea elegans Franchesi by J. Harrison Wright

First noted and named by Franchesi as a new species when he offered small seedlings in his catalogue about 1902. First published by Dr. Beccari from material sent him by Franchesi in "Palme Americane" Webbia Vol. 11 in 1907 as a valid species.

The original type plant was in the garden of a Mr. Buddington on College St. Los Angeles near the Sisters" Hospital. It was planted in the eighties as a small seedling from John Rock,s nurseries at San Jose. Beccari's description is in error as to the petioles which he calls "smooth" He had only a leaf from on of Franchesi's young plants. The petioles of mature plants are really as thorny as in armata or Brandegei. The palm is of exceedingly slow growth and bears fruit when only 3 or 4 feet in height, which seems to indicate a very dwarf palm at maturity. The flowering spadices are carried erect and well above the crown, only when weighed down by the growing fruits."

There is but one conclusion to draw and that the plants grown by Mr. Wright from the Buddington type are hybrids of a smooth dwarf with E. armata. The seeds of elegans came from near Hermosillo Sonora, andaculeata from Cofradia, not far off.

Modern progress has destroyed the type of E elegans for the Huddington garden is no more, and its plants killed, all that is left of the type is the seeds grown by Mr. Wright and the Huntington Garden, three plants, two dwarfs 35 years old and not eight feet high and a tiny plant in the Garden. The Wright plants are mature and fruiting copiously.

Erythea Loretensis n. sp.

Type locality, the corner of the block south of the schoolhouse in Loreto, L. Cal., a single, vigorous tree 25 ft. high, with persistent and appressed leaves as in E. Brandegei and similar inflorescence. Fruits black and edible, with pulp .25 inch thick and separating readily from the single seed which is shiny-black and so flattened at the poles as to be lozenge-shaped. The fruits seem spherical, but are very oblate, measuring 13x16-18mm. and the seeds 12x8 mm. with a central pit 1 mm. deep and the outer pulp loose from the seed and with a papery skin

Fruits of edulis are depressed-globose, 20x15 mm. with pulp closely adhering to the reddish seed.

The stipular sheaths of edulis and Washingtonia are nearly a foot high and twice as long and half an inch thick and make fine packsaddle pads, preventing blistering in the intense summer heat.

There seems to be a good variety in a form of Brandegei distributed by B. from the Cape which we may call **var. spiralis** in which the leaves are arranged in conspicuous spirals on the trunks.

Beccari's armata var,microcarpa seems a good one, with the linear and drooping panicles not so conspicuously exserted and with small and greenish flowers and small and oval reddish fruits 15x10 mm· dimensions.

Allium

In a recent trip to Cuyamaca lake Cal,, south of Julian, at an elevation of 4500 ft. I found two Allia growing in the open A. amplectens and Parryi. The former grows singly, or in twos in the interspaces, in gravel, along with Calochortus, Thermopis, Godetia, etc. The soil was a little clayey, bnt mostly gravel, and inclined to bake. The bulbs were about 4 inches in the ground their method of extra propagation seems infrequent by the splitting of the bulb. The stamens a little exserted. The flowers are globose and very thin and abont closed and always white. The heads are mostly an inch wide and rather dense. The leaves are

several and very long and narrow. The bulb coats are brownish without and mostly deep-red within. The stems are 5-10 inches high and erect.

Allium Parryi grows abundantly on wash land where the rains have washed the clay down to the more level gravelly soil, and below where the other onion abounds, The leaves are single to each stem, and arcuate. The stems incline to be ascending and rarely are over 4 inches high. The flowers are about 8 mm. long, and whitish and open. The bulbs are nearly spherical, and rather reddish. The outer perianth segments are reddish-striped and triangular-acute and somewhat outcurved. The pedicels are green and thickened upward. The crests of the ovary are raised and thick and on the angles. The bulb scales differ. There is a very thick and opaque one and then a thin one like the transparent outer skin of coats with markings, and having the usual vertically-oblong cells of such skins, then another thick and red coat and so on. Once in a while a person can make out faint vertically oblong or nearly square meshes on the thick coats as in Sanbornii but Parryi does not belong in the fimbriatum group with which it has been put. Sanbornii differs from Parryi chiefly in the oblong, rounded and obtuse perianth segments. The bulbs of both species split through the middle as a means of extra propagation, and are red.

Allium amplectens is well marked by the slightly exserted stamens and the pure white and globose flowers. The bulbs are scarlet within and split down the middle in age.

Allium dichlamydeum Greene was put as a possible form of serratum in my revision, Greene's species as a rule are spurious, and his characters visionary. I found it growing on a sea-cliff at Mendocino City It is probably common along the Coast. The cliff where I got it is a flatiron shaped piece of upturned Tertiary strata, forming an area few rods square and covered with loose soil, mostly sand with a coat of rather dense fibers of decayed or decaying roots, the bulbs being a few inches below the surface and single and seemingly not propagating by runners, rhizomes. Since the type locality is "seaward slopes" near the Mission hills of San Francisco my plants from a remote region may not be typical. Greene says there is a remarkable difference in the floral segments, which I do not find in mine. Jepson in his "Manual" p 220 discredits the perianth story by saying the segments are almost equally spreading. Neither writer mentions the bulb scales, but Jepson says the two bracts are united high up and pedicels are stout. Neither do they speak of the flowers being a very deep-red-purple like serratum and acuminatum, and of the rigid segments. The crests seem to be central. The meshes of the bulb coats are

conspicuously arcuate, much more so than in Jepson's figure of peninsulare, and about the same as my no. 41 of attenuifolium, and like that, very irregular. There is no sign of serration on the margins of the segments. The bulbs are small, rarely half an inch wide and spherical and with gray coats. The plants grow in dense masses so as to color the hillsides red and are 6-12 inches high. with flat and rather narrow leaves. Growing with it are Brodiæa, Gentiana and Godetia.

Allium Parishii Watson was very poorly described and its type locality inaccurate as Cushenbury spring. It does grow far above the spring in the alpine regions, and is the same as monticola of Davidson, and which I fully described in Cont. 15 p 52. Parish was responsible for the confusion.

In 1931 I had an exceptional chance to observe Texas onions the roadsides and waste places were white with them for many miles, the plants are as a rule 6-12 inches high and erect and with long and grass-like leaves to a stalk or peduncle. The bases of the leaves are enlarged and sheath-like and usually ribbed and overtop the peduncles. This applies to the mutabile group, the most common one, reticulatum belongs in this group but is conspicuously crested and the perianth elongated and dries bluish-purple. The roots of all the species but scaposum propagate by division of the mother-bulb by the production of a bulblet arising from the lower edge just above the roots, which grow downward and make the parent bulb appear oblique till the bulblet splits off. The bulblets also develop from below the sheathing scales and are white, while the mother scales are mostly chestnut-colored. The distinctions of Small in his southern states flora do not seem to hold out. His Helleri certainly is Nuttallii. His Cuthbertii seems to be reticulatum, anh arenicola and microscordium are hopeless. Mutabile and Nuttallii seem separable on the texture of the flowers, but their color is worthless, Nuttallii is mostly white at low elevations, and pink elsewhere, mutabile is mostly white. and with a more robust habit and the lax perianth and very fibrous bulb scales with open lace-work throughout. Nuttallii has the lacework of the scales consolidated into a straw-colored area below the middle. Nuttallii forms a new bulb by splitting of the mother one and the downward extension of the parts from the parent, the new bulbs pointing forward, often making twin peduncles. The bulbs of mutabile are usually twice as large as in Nuttallii, often an inch wide and spherical to ovate. The perianth segments are rather narrower than in Nuttallii and the leaves are often 5 mm. wide. The segments of Nuttallii are narrowly elliptical rather than lanceolate as in mutabile, and do not crinkle as it does. The color of the flowers is no character of any value.

Allium Coryi Jones I found abundant at Madera Springs on gravelly and sandy slopes on the edge of the live oaks on the north side of the Davis mts. The type locality was at Alpine on the southern side. The flowers are often ting ed with red.

Allium acuminatum Douglas grows in the hills near San Simon Ariz, a locality quite out of range.

Allium hæmatochiton Watson was said to have a rhizoma, and has been a puzzle ever since, but an examination of the type reveals no rootstock. It seems probable that Watson inferred one because of so many scales, but there is none. This throws Davidson's Mar vini into synonymy. The name, a poorly constructed one was meant to refer to the red bulb scales, but they are sometimes white. It is easy to imagine a rootstock is present when it is absent, but the many coats are not connected by a rootstock.

Allium Bigelovii Watson has the oblong meshes of the bulb coats rather oblique at the ends and arranged in many lines, and the walls are raised much after the fashion of acuminatum, forming deep pits. The vertical lines of the meshes are obscurely sinuous. The bulb coats are firm and not flabby. In the dry specimens the crests are very thin and triangular, ½ mm. high or more and not spongy. The leaves are mostly two, but sometimes only one. None are enlarged upward, but they overtop the inflorescence It propagates by bulblets produced from the lower corners of the mother bulbs, and not by stolons.

Allium stellatum Ker. was out of place in my revision for it goes with cernuum and not reticulatum. It has the long and narrow bulbs with long neck peculiar to the cernuum group, and the vertically linear close-set meshes of it. The peduncles are not fistulous nor hooked, and the leaves are grass-like and four and nearly as long as the peduncles. The pink flowers are very broad and open and about 4 mm. long, with the broadly ovate segments spreading and barely as long as the stamens or a little shorter. The crests of the ovary are on the corners and not close to the style, and are triangular and spongy and about half as high as the pod is long The pedicels are capillary and lax and about an inch long and many. This group is allied to the hæmatochiton-validum one.

Allium glandulosum Link & Otto was got by Mrs. Mexia at Cuarnavaca, 4600 ft. alt. no 2726, in open woods of pines and oaks, the usual cernuum habitat. Plants tall and with the same scales and 2-4 leaves. Bracts small. Peduncles enlarged at base. Flowers 4 mm. long, with perianth parts linear and spreading, black-purple. Ovary with low and central crests. Pedicels an inch long, filiform, not reflexed. Bulbs ovate, about an inch long, dividing by splitting, and producing bracted rhizomes 2 mm. thick, with bulbs at the ends. Sheaths 2-4 inches long.

Yucca valida Brandegee is the only Cape yucca, and grows normally, in the shade of other brush and rarely is 8 ft high, but west of La Paz is a forest of it where the trees are 30-40 ft. high and branch as brevifolia does, but the leaves persist longer and in age are reflexed so that the swab-like tips are often 6-8 ft. long. The leaves rarely are over a foot long and are flat and thin and with few or no threads on the margins and then serrulate. They are long-acuminate and contracted below. The flowers are about an inch long and rather globose-ovate, but variable and white. The fruit is decidedly juicy when ripe and pendulous. It is clearly a close relative of Schottii if not a good variety of it. My no. 27574 from road to the Cape from Todos Santos west of La Paz.

Hymenocallis jaliscensis n. sp. Jones Mex. no. 458 P.college no.119358. Salcillo, Jalisco, Mex. June 1 1892, also at La Palma near by. Allied to H. Caynemensis Herb. Plants about a foot high, erect or ascending,fleshy and thick, from large and tunicated bulbs with brownish scales with filiform vertical cells. Leaves broadly linear, arcuate and acuminate and equitant. shorter than the peduncles, rather many. Corolla tube about 3 inches long and with segments about as long, and a little longer than the stamen. Style elongated and as long as the petals. Fruits many, ovate , 4 mm. long, congested and with 2 hyaline and petal-like bracts 1.5 cm, long which are tapering, smooth, acute, and linear. Leaves very finely striate.

Sisyrinchium translucens Bicknell looks like an Hypoxis, my no. 27570 growing on the prairie at the laguna. Laguna mts. L- Cal

Plants 6-12 inches high, erect, annual or short-lived perennial perfectly smooth throughout. Leaves about $\frac{2}{3}$ the length of the peduncle, very thin and acuminate,4 mm. wide, with 4 strong nerves and twice as many fainter ones, all basal, many Proper peduncles filiform but winged on both sides with wings 1 mm. wide. Spathe 1-2 inches long, with the outer bract a half to twice longer than the inner one and long-acuminate. Flowers normally 3-4, rarely more, on capillary pedicels an inch long, ight-yellow, about 8 mm. long Fruit cordate-obovate, about 8 mm. long and retuse and shortly-acuminate into the pedicels,with very thin walls showiug the outlines of the several rather favose black and oblong to oval seeds 1 mm.long.

Washingtonia filifera Wend has the one-seeded fruits never spherical nor more than oval, and in age the inclosiug pulp becomes juicy and black, separating from the seed whieh is rough and yellowish and sulcate on the raphe side or end. The measurement is 6x5x4 mm.

Iresine obtusa n. sp. No. 27360, Borrego ranch, Laguna mts. L. Cal. Sept. 24 1930. A tall and climbing shrub with the habit of I. interrupta, but leaves oblong-ovate and truncate or rounded at tip and cuneate below into a margined and short petiole, entire. Whole plant perfectly smooth. Inflorescence a terminal and very compound panicle leafy below, of innumerable white racemes, the flowers with obtuse papery bracts.

Iresine pulchella n. sp. Cayuca ranch, Sierra Gigantа mts. L, Cal. Oct. 23 1930. A divaricately branched shrub with gray bark and many ovate to lanceolate panicles 4-6 inches long which are white-woolly. Leaves deltoid-ovate, cordate, acutish, 1 inch long entire, rather thick, slightly veiny below, green above but slightly pubescent, densely white-woolly below with branched hairs, on a stout petiole 4 mm. long. Flowers in compound panicles, nearly sessile in dense clusters of 6-8 flowers which are racemose on the branches. Bracts very thin and hyaline, acutish, inclined to be smooth above.

Eriogonum Lagunense n. sp., No 27568, Mts. east of Loreto on the coast, Oct 17 1930. Allied to E. inflatum, but without the inflated stems of E. trichopodum, and with its diffuse and branching habit much accentuated so that the plants form airy masses 4 ft. in diameter, but ultimate branches not as filiform as in trichopodum. Involucres the same, but less deeply indented. Flowers the same but segments inclined to be triangular-oblong and pubescent or puberulent only on the midrib and with margins white, hyaline and broad. Whole plant yellowish, but stems glaucous. Leaves densely strigose throughout, mostly round, rarely ovate, with conspicuous deltoid base, about 1 inch. long. Growing in rocky places from a woody base.

Suæda ramosissima(Standl.) Dondia ram. Standl. N .A. Fl. This grows in saline places No- 27558 Loreto Nov 1 1930.

Allionia and Commicapus Standley. It is interesting to see him back in the ranks of sensible botany again, abandoning his untenable genus. He seems different from Rydberg who was always a mule in sticking to blunders after he had made them. See Field Mus. 2 3.

Drymaria sperguloides Gray. It is not to be wondered at that Coulter got species of Drymaria in Mollugo. The descriptions in the Synoptical Flora are very poor. and specific characters are conspicuously omitted, and the species not at all properly grouped. I cannot see any generic relationship between D. holosteoides and crassifolia and sperguloides and the rest of the group. A marked character of the arenarioid species is in the rather rigid and sharp or acerose sepals. This particular group has oval sepals without apiculation or nerves, and with conspicuous and hyaline

margins, about equaling the oval-ovate capsule which is smooth and shining and very finely striate longitudinally with beaded lines and mostly 3-4-valved, and with about 8 large and circinate seeds with coat low-tuberculate-striate longitudinally. This genus I would call **Mollugophytum** and would refer to it D. crassifolia Bth. as **M. crassifolium**, D. holosteoides Bth. as **M. holosteoides**, and D. polycarpoides Gray as **M. polycarpoides** and D. sperguloides Gray as **M. sperguloides.** A conspectus of the proposed genus is given below.

Leaves broad.

Maritime Perennials. Flowers umbellate.
1 M. crassifolium

Annuals.

Petals abortive or very small. Leaves conspicuously petioled. 2 M. holosteoides

Petals conspicuous Flowers cymulose.

Leaves very shortly petioled
3 M. polycarpoides

Leaves linear. Flowers cymulose, with slender pedicels and equally as long common peduncle.
4 M. sperguloides.

Clematis Barrancæ n. sp. Guadalajara, Mex, Nov. 25 1930. Flowers perfect. Leaves bipinnate, the pinnæ ternate, final segments below inclined to be scallop- lobed below and rather deltoid-ovate and acutish and cordate, 2 inches long. Fruit ashy, with short and stiff hairs, the tails much elongated and thinly plumose. A smooth and high-climber. Leaflets 9-12, rather leathery

Thalictrum peninsulare (Braudg.) Rose replaces T. Fendleri in similar situations in the Lagunas. It is erect and about 3 ft. high, growing singly, and is dicœcious. The panicles of flowers are rather small and with capillary rays ending in very small heads of fruit consisting of 1-3 seeds on subulate stipes ¼ as long as the seeds which are about 4 mm. long and 2-3 mm. wide. The seeds are really half-oblately oval with one face nearly straight or a little bowed in the middle and with the other face greatly arched. The surface of the seeds is very coarsely corrugated into few and raised meshes, and is not pubescent and has a short and triangular beak. Leaflets rather rhomboidal, 1-2 cm. long and nearly as wide and with variously cut lobes or teeth which are deltoid-acute at tip. It is common along watercourses in the shade. Lower Temperate life zone.

LYROCARPA.

Watson, in the Flora of California Vol. 2 p. 44 says of this genus " pubescent annuals". From his description of L. Palmeri we would infer similarity to the type species. Watson often blundered, as we all do, on species, but this time it is on the genus.

Lyrocarpa was founded on L. Coulteri which is a shrub as shown by me in 1929. It has been found in western Arizona by others than myself near Gila Bend.

SYSTEMATIC POSITION OF SYNTHLIPSIS.

In commenting on the relationship of Synthlipsis the Synoptical Flora says its place is near Greggia, Lyrocarpa, Physaria, and Lesquerella. That it is related to Greggia its nearest ally is manifest for it is uncertain if Greggia can be maintained if variations of it continue to be found like those got by me in 1931. There is nothing in the narrowness of the pods of Greggia to separate the two genera. It appears that Synthlipsis is always an annual, while Greggia is a rather shrubby perennial. The relationship to Physaria, Lesquerella, and Capsella is more remote. Its relationship to Lyrocarpa is fanciful rather than real for the flowers are not alike, and the pod more like Capsella. About the the only thing available to keep the genera separate is the sharp and processed edge of Synthlipsis valves in distinction from the rounded edge of Greggia valves. Pods of Greggia are frequently conspicuously flattened and truncate to emarginate at both ends as in Synthlipsis. and so the distinctions between the genera, at first sight, seem too attenuated to hold. The floral characters are substantially the same in Synthlipsis, Greggia, and Dithyræa except that the spreading calyx is present only in D. Wislizeni and not in Californica. Physaria didymocarpa has rather loose sepals, but not conspicuously spreading. Rose's Synthlipsis lepidota is a Lesquerella, which I would call **L. lepidota** n. n. A meaningless name in this genus for leaves are mostly lepidote. Dithyræa is the most specialized genus in the group because the margins of the pods are processed into winged midribs. while Synthlipsis has a mere midnerve a little produced toward tip of pod as a rule. Greggia has no evident midnerve usually but with pods with rounded margins. The pods of Greggia vary much in cross-section. I think the genus is nearest Lesquerella, and that Synthlipsis is intermediate between it and Dithyræa, while the Capsella-Lyrocarpa group is an offshoot between Synthlipsis and Dithyræa for the pods of both have a mere midnerve instead of a specialized one as in Dithyræa, but are conspicuous in the pods being greatly widened above but not didymous, the Hutchinsia section of Capsella being a connecting link with Synthlipsis. The sepals of Capsella are inclined to spread. The relationship of the group is quite near to Thlaspi and Lepidium.

Cotyledon. Jepson, Man. p. 452 is hazy about the gender of this genus, making it feminine in all his names but edule and insulare, both Gray and Watson assumed it was neuter because it ends in "on" a common neuter term. This shows the folly of men unfamiliar with Latin trying to write Latin names. They should have their censors on the job always.

It should be said of Synthlipsis that the flowers are white and that the claws of the petals are so close together as to appear united making the abruptly spreading blades seem like lobes of a gamopetalous corolla.

Eriogonum trichopes Torr. The more I see of the hairsplitting of Gray in correcting hybrid names like this the less I think of it. Gray was no Greek scholar as shown by his ignorance of the gender of words ending in "omega nu" in Greek, such as Cotyledon. He was a savage and unscrupulous partizan.

Sedum barrancæ n. sp. No. 27845 Under cliffs at La Barranca, Guadalajara Mex., Nov. 17 1930. in wet and loose soil, growing in tufts from long or oblong leaf fascicles 1-2 inches long stem leaves many, narrowly elliptical to linear-elliptical, 1-2 inches long, 1 cm. wide, sometimes acute, entire, sessile. Inflorescence a raceme-like arrangement of short and scorpioid racemes of 6 flowers which are sessile and bracted with ovate to nearly round bracts 5-6 mm. long. Flowers white, but tinged with red or green and about 4 mm. long and wide. Petals cordate-ovate and with acuminate tip and equaled by the stamens which have a wide and triangular base and filiform filaments. Pods 2, acuminate. Stems simple.

Astragalus Piersonii Munz & McBurney Bull. So. Cal. Acad. Sci. Vol. 31 p. 67 ff. The proposal of these new synonyms is wholly unjustifiable for there is ample material in the Jones part of the herbarium for proper indentification of this plant as A. Coulteri It is unfortunate that the indefatigable botanist of Pasadena must have his name hitched to a synonym for he deserves better treatment. This plant is described as an annual, but is perennial as are all the forms of lentiginosus.

A. Crotalariæ var. Davidsonii l. c. is the usual Imperial val. ley form of Preussii and is matched exactly by a specimen in the herbarium.

A. insularis var. Harwoodii is apparently true triflorus DC.

A. pachypus var. Jaegeri l. c. is said to have yellow flowers but there is nothing in the specimen to show it. There are no yellow-flowered Astragali, but many ochroleucous ones.

They also propose a new variety of A. Douglasii. I have been convinced that none of the proposed varieties are good.

Mrs. McBurney has had no field experience enough to justify an opinion of the species but for years she has had access to my great collection and use of my monograph enough to become familiar with the Preussii to which her proposed species belongs.

Munz seems to be copying Jepson's system of making fake varieties as used in his Manual, a system that he was the first to criticise severely.

Alchemilla hirsuta HBK. It was quite surprising to find this species abundant on the laguna, another link with the western flora.

Pithecollobium minutum n. sp. No. 27265, Cacachilla mts. Oct. 2 1930. An open bush, 6-8 ft. high, with inch-long straight spines in pairs. Leaves nearly as broad as long, 3 inches long, of about 6 pairs of pinnæ which are about an inch long and open and 1 cm. wide. Leaflets about 13 pairs, linear, a little arcuate, 1 mm. wide by 4 mm long, minutely pubescent. Pod nearly black, 4 inches long by half an inch wide and 4-6 mm. thick, and oval in cross-section, smooth, triangular-acute and short-stipitate, with ring-like base. Branches slender and spreading as in Mimosa biuncifera.

Pithecollobium minutissimum n. sp. No. 27266 La Barranca Guadalajara Mex. Nov. 25 1930. A small tree roughly branched and spiny at the nodes, closely short-woolly throughout with rough bark. Leaves 4-6 inches long by 1-1.5 inches wide, bipinnate, with stout petiole half an inch long, and with rachis almost as stout, with the ascending pinnæ about 3 mm. apart and about 40 pairs, each pinna nearly an inch long and nearly sessile. Leaflets about 30 pairs, imbricated, oblong, obtuse, 2 mm. by 1 mm. Leaves clustered at the ends of the stout twigs. Fruit nearly black when ripe, reflexed on a very short and stout pedicel and broadly linear, about 3 inches long, a little arcuate, $\frac{3}{4}$ inch wide and $\frac{1}{4}$ inch thick, quadrangular, obliquely apiculate at tip and cuneate at base, minutely woolly. Flowers absent. Fruits vary from sessile to having a stipe an inch long, my no. 27266a

Pithecollobium acuminatum n. sp. No. 27255 Above Primiera Agua, in the Sierra Giganta, Oct 20 1930. A shrub 4-6 ft high with stems beset with chestnut colored or white warts. Leaves a pair of pinnæ, with about 5 pairs of leathery venose and dark-green leaflets 1 cm. long by 3 mm. wide, blunt but apiculate, often arcuate, oblong, with midrib set in the middle and with 3 accessory veins below it, half-cordate below, and set on the upper side of the grooved rachis which is, like the leaflets, minutely pubescent. Leaves about 1.5 inches long, with proper petiole stout and 2-4 mm. long, and with a pair of chestnut colored spines 4-6 mm. long at the base, leaves inclined to be fascicled in the axils and very numerous. Pods cartilaginous and nearly round, 4 inches long and .5 inch wide, a little flattened and with uneven edges, long-acuminate on the empty tip, and contracted below into a stout stipe 1 cm. long. Pods dark-brown, with about 5 seeds and no intermediate pulp. Flowers racemose.

Lysiloma Cayucensis n. sp. No. 27251 Cayuca ranch Sierra Giganta mts. L. Cal. Oct 23 1930 A slender and open branched shrub or small tree, with twigs somewhat chestnut colored and very slender and very leafy. Leaves 3-6 inches long with 3-4 pairs of pinnæ which are about 2 inches long. Leaflets 15-20 pairs, narrowly oblong, barely acute, about 6 mm. long by 2 mm. wide, appearing smooth but really very sparsely pubescent, venose, with about 6 large meshes on either side of the midrib. Pods 3 by 1 inches, elliptical-oblong, acutish and rounded at base and on a stipe 4-6 mm. long, reddish and thin.

Albizzia occidentalis of authors seems to be a Leucæna, it is a beautiful tree with tall trunk and widely spreading branches. I got it both at the Borrego ranch and on the Cape road to Todos Santos.

Climacorachis Hemsl. & Rose Cont. Nat. Herb. 8 43 1903 is not distinct enough from the pudica-pusilla section of Mimosa. I therefor propose the transfer of their names of species as follows. **Mimosa Mexicana(H. & R.)** C. Mexicana H. & R. M. **unijuga.** C. fruticosa H.& R The body of the pod separates from the rim as in Mimosa. The annual forms of Æschynomene are altogether too close to Mimosa for comfort. That Mimosa Æschynomene, Acacia and Pithecollobium need a thorough overhauling goes without saying, but Rose was not the man to do it because of his sloppy generic ideas.

Mimosa Lagunensis n. sp. No. 27290. On the laguna, Laguna mts. L. Cal. Sept 22 1930. A rather widely branched shrub 4-6 ft. high, with hooked prickles. Leaves with 2 pinnæ and with each pinna having 5-10 obliquely oblong leaflets about 4 mm. long by 2 mm. wide, rather rigid, nervose, sharply apiculate, half-cordate below and with midrib not central, and with 5 nerves from the base on the upper side, setosely hairy especially on the margins, with the rachis and petiols short and very hairy. Heads few-flowered, on filiform peduncles 1-2 inches long. Pods short-stipitate, an inch by 4 mm. long and wide, of about 4 joints constricted ¼ the way to the suture and abruptly setose-acuminate, sparsely and very shortly aculeate and short-pubescent. The very small leaflets and pods simulate Æschynomene.

Mimosa inequalis n. sp. No. 27267. Guadalajara, Mex. Nov. 26 1930. Annual, very widely branched, a foot high. Leaves sparse, of 2 pairs of leaflets which are obliquely obovate and rounded, with midrib not in the middle, thin, barely apiculate, green, strongly nerved, with 3 basal nerves above the midrib, setosely yellow-hairy as are the pods also, on petioles 1-2 inches long which are similarly hairy. Heads on stout peduncles. Pods ½ ¾ inch long, obliquely oblong, 4 mm. wide, shortly acuminate, flat, 3-seeded, with margins little if at all indented, many, in compact heads, body easily separating from the frame.

Mimosa Mazatlana n. sp. No. 22451. Mazatlan, Mex. Nov. 20 1928. A prostrate annual, setosely hairy with yellow and appressed-pubescent hairs throughout except the puberulent faces of the pods. Leaflets about 10 pairs, on 2 pinnæ, acutish, 4-6 mm. long, 2 mm. wide, collapsing easily, pinnæ 1-2 inches long. Stems with scattered and recurved prickles Pods in heads, oval to oblong, not over 1 cm. long by 4 mm. wide, 1-3-seeded, with joints easily permitting separation of the sides. Collected there by Mrs Mexia, also from Uraguay.

Cassia absus L. N. 27191. La Barranca, Guadalajara, Nov. 23 1930. Perennial, 2 ft. long or more, subdecumbent, racemosely branched above. Leaves thin, 2-4 inches long, on filiform petioles 2-3 inches long, of 2 pairs of oval-obovate and rounded leaflets, all oblique, rounded and entire, an inch long, rather triple-nerved below, about sessile, smooth, paripinnate, the upper ones with single flowers in the axils on pedicels filiform and 3 mm. long. Flowers yellow, 4-6 mm. long, with the calyx cleft almost to the base. Stems ending in pseudo-racemes 1-3 inches long which are glutinous-hispid-hairy. Pods perfectly flat, 4 mm. wide, an inch long, obliquely triangular, acute at both ends but not stipitate, vetch-like, 4-seeded, with flattened, oval-obovate seeds 3 mm. long and with about 10 faint lines of shallow pits, glistening-black. Valves opening along the dorsal suture and curling up as in Vicia but plants without tendrils.

Cassia tenuicaulis n. sp. In ditches at Guadalajara, Mex. Nov. 26 1930. A very slender perennial(?), 2-3 ft. high, widely branching from the base, the whole plant glutinous-hairy. Stems striate-angled. Leaflets 20-25 pairs, rigid, overlapping, linear, very sharply and obliquely acute, nearly smooth except on the margins, 3-nerved from the very base, 4-6 mm. long. Flowers in short racemes, very small and with large bracts. Pods an inch long, conspicuously constricted much as in Desmodium. Leaf rachis hispid with hairs pustulate at base.

Cassia stellata n. sp. No, 27196, Cacachilla mts. L. Cal., Oct. 2 1930 and at Triunfo, No. 27200, Oct. 7 An open-branched shrub about 6 ft. high, appearing as if yellow-glutinous throughout, but not at all glutinous, but densely yellow-stellate. Leaflets about 3 pairs(2-5), 1-2 inches long, lanceolate and shortly acuminate to elliptical and apiculate, rather oblique below, thickish and entire, with leaf rachis 1-2 inches long and about equaling the proper petiole. No glands. Flowers few, light-yellow, 8 mm. long, with dark-striped petals, on a pedicel about 1 cm. long. Pods 4 inches long by 4 mm. wide, nearly straight, manifestly constricted between the seeds both vertically and laterally, flattened, short-stipitate and apiculate, narrowly linear.

Cassia rotundifolia Rose ? No. 27192., Guadalajara, Nov. 26 1930. Annual, with the habit of prostrate forms of Hosackia but apparently in the bifolia group. Stems branching only at the base, slender, a foot long, shaggy with long and rigid and spreading hairs which extend often to the lower part and some leaves. Internodes mostly shorter than the leaflets. Leaflets 2, on the ends of stout petioles 2-3 mm. long, rounded obovate, not over an inch long, ascending, leathery, sessile, oblique at very base only, pinnate-veined, but upper side inclined to have 1-3 accessory veins at very base, not at all parallel-veined as in C. bifolia, entire, rounded to a little retuse at tip, conspicuously, closely, and finely veined, mostly smooth and shining. Stipules green about 1 cm. long obliquely triangular-ovate, acerose, parallel-veined, cordate below. Pedicels 1-1.5 inches long, becoming smooth, filiform, ascending, straight, often twin. Flowers shaggy below, 5 mm. long, yellow. Fruit about 1.5 inch long by 5 mm. wide, flat, linear, oblique at both ends, straight, many-seeded. Seeds flat rectangular, apiculate on one corner, smooth. Flowers in the upper axils. Frequent in old fields. A unique species which I had called C tenuivenosa, but Rose may have antedated me

Psoralea decipiens n. sp. No. 27178. La Barranca, Guadalajara, Mex. Nov. 23 1930. A prostrate and weak herb 1-2 ft. high, allied to P. pentaphylla, but leaflets acute and ovate and an inch long, rather venose, nearly smooth, 3, on a petiole fully 2 inches long. Flowers very small, in heads on long peduncles becoming a little racemose in fruit. Pods about 4 mm. long and ovate plus a long and hooked beak, growing in moist ground.

Psoralea Rafælensis n. sp. La Sal mts Utah, June 3 1914. Plant with the habit of P. mephitica, from a much branched and woody base. Leaflets cuneate-obovate, 1cm. long, 5, with a common petiole 3 cm. long. Leaves smooth except on the veins and a little pubescent below. Stems 6 inches high and many and much clustered in flat tufts. Flowers about 3, in an almost sessile cluster in the axils, about 4-6 mm. long. Calyx oblong, not inflated, 2 mm. long, lobes 1 mm. long.

Psoralea Rafaelensis var. magna n. var. San Rafæl Swell Utah May 11 1914. Same habit as the species, but leaves 1 inch long and fairly pubescent below. Flowers many in a dense head or short spike. Calyx inflated, 4 mm. long, the lobes over half the whole. The San Rafæl Swell is just on the west side of the Green river from the La Sal mts.

Dalea nummularia n. sp. A low shrub of the Johnsoni group, with few spines and warty stems. Flowers bright-purple, in dense and ovate spikes 1-2 inches long, spreading, with calyx densely hispid-hairy with yellow hairs, and with red glands, 5-ribbed, sessile, with long and subulate calyx lobes, and

early deciduous 3-cleft bracts, subacute or equaling the flowers. Fruits obliquely oval-ovate, half an inch long and mottled, with glands much as in D. Johnsoni. Leaves many, nearly sessile on a stout petiole with 6-20 pairs of oval to nearly round and ultimately rigid leaflets 4-6 mm. long and gradually reduced above. Leaves 3-6 inches long. Green River Utah, May 28 1914 P. coll. No. 28257 and Willow Spr. Ariz., June 11 1899, Jones. Plants puberulent throughout

Astragalus Vaseyi Wat. I had never seen this growing till Apr. 2 1933. It seems confined to the Mexican border on the dry and sandy washes of the steep southern slopes of San Jacinto mt., in the Lower Temp. life zone, with Pinus monophylla. Watson describes it as a doubtful annual. It is clearly a biennial or winter-annual for the great mass of stems now making a mat on the ground could not have grown from seed since the snow melted. It has the same habit as A. Coquimbensis Reiche which antedates A. Thurberi Gray, in growing flat on the ground in great tufts from a single taproot. I have seen similar looking plants with the silvery leaves which I assumed were A. lentiginosus but may have been this species. The fruits are manifestly stipitate in some cases and flattened ventrally and are obliquely half-elliptical and with the suture straight nearly to the flat and incurved tip. The pods are about round in cross-section and conspicuously inflated.

Dalea Hutchinsoniæ n. sp. Pinos Altos mts. N. M. Sept. 23 1931, under pines, in open places. Weak annuals a few inches high, erect, with capillary stems and leaves which are smooth. Leaves above reduced to a naked rachis and always green and with scattered and depressed glands. Stems racemosely branched from the base, and ending in a short head or spike about half an inch long and on a capillary peduncle. Calyx long-white-pilose, 3-4 mm. long, with the subulate lobes as long as the tube. Tube with 5 dark-green very prominent and raised nerves. Flowers purple and rudimentary. Leaflets 1-2 pairs, an inch long .5 mm. wide. This seems to belong to the alopecuroides section. common in the forest at 7800 ft. alt. Named for Mrs Susan W. Hutchinson, a member of my party, specially interested in the genus.

Dalea Hutchinsoniae var. anomala n. var. Chiricahua mts., Ariz. in Rustlers' Park, Sept. 22 1931, 8000 ft, alt. Plants a few inches high, very slender and widely branched and with single spikes about an inch long on the filiform peduncles. Whole plant smooth except for the ciliate-margined lanceolate and green bracts, and subulate calyx lobes which arise from a deltoid base. Calyx conspicuously 5-ribbed with raised and black ribs 3 mm. long. Flowers minute, purple. Leaflets 2-3 pairs of linear-oblong and retuse members about 1 inch long by 2-3 mm wide. This connects with alopecuroides.

Dalea barrancæ n. sp. No. 27230, La Barranca, Nov. 23 1930. Slender annuals with filiform stems paniculately branching throughout. Leaves about 2 inches long, of 4 pairs of elliptical-linear leaflets narrowed below and sharply acuminate above, appressed-strigose, not over an inch long, mostly half an inch long and the petiole not longer than the lowest leaflet. Spikes termi-.5-1 inch long. dense, on a filiform peduncle 2-3 times as long. Flowers and bracts long-silky with hairs a little twisted and seemingly beaded and white. Calyx 5 mm. long and equaled by the green bract which is broad at base and long-acuminate. Calyx conspicuously 10-black-nerved, with the lobes a little longer than the tube and subulate. Petals purple, barely longer than the calyx. Common among weeds.

Dalea decipiens n. sp. No. 27229, La Barranca, Nov. 16 1930. A slender and erect shrub 3-5 ft. high, resembling D. uncifera but with absence of visible bracts and blunt leaflets, and flowers apparently small. Stems much-and alternately-branched above by slender and flexuous branches ending in slender-peduncled spikes, leafy below. Leaves 2-4 inches long, wide, with 4 pairs of leaflets which are white-hairy when young, and green above and smooth in age. Leaflets about 1 cm. long, elliptical, barely apiculate, acutish below. Petioles about as long as the leaflets. Leaflets separated about 2-3 cm. Upper stems hoary. Spikes 1-3 inches long, the terminal one 2-3-times as long as the lateral ones, on peduncles an inch long, 4 mm. wide. Bracts rudimentary and deciduous. Flowers closely sessile in dense spikes Calyx chestnut-colored above, green and very pale, a little inflated, straight, with rudimentary teeth, hairy or nearly smooth. Pods about 3 cm. long, a little surpassing the calyx, about round but slightly flattened. Flowers absent but probably purple and small.

Tephrosia fruticosa n. sp. No. 27207, La Barranca, Nov. 17 1930. Strictly erect, 2-4 ft. high, rigid. Leaflets 3 inches long by an inch wide, acute and apiculate, very venose and with veins yellow-hairy, one pair with almost no rachis, finely pubescent all over. Flowers yellow and purple-veined, 1 cm. long, ascending in a dense spike 4 inches long. Calyx lobes long-acuminate and pilose. Bracts elliptical, nearly 1 cm. long, acute at both ends and narrowed below, very pilose and appressed and with many parallel nerves, pubescence of leaves velvety. stems branching above. This may be an Eriosema.

Tephrosia Lindheimeri Gray, No. 28552. East of Carriso Spring Tex. Apr. 27 1931. Plants growing flat on the ground in mats 4 ft. wide. Stems, petioles, rachis and petiolules densely yellow-hairy. Leaflets about 6 pairs, rather oval-obovate, 15 cm. long by 4 cm. wide, leathery, smooth above and venose, pilose on

the nerves below, appearing as if albomarginate because of the pubescence extending a little beyond the margins below, rounded, entire, obscurely apiculate, with rachis strongly angled. Flowers purple, about 1 cm. long, scattered on the floral rachis for 6 inches in length. Pods absent. Leaves many, 6 inches long. On prairies.

Cracca collina Jones seems to be Eriosema multiflorum Rob.

Cracca pumila (Rose) ? C. N. H. 10 99 1906 as Benthamantha. Nn. 27249, Primiera, Sierra Giganta mts., 27239 Cayuca Ranch same loc. Oct. 26 1930. Very slender and erect herbs 2 ft. high, racemosely branched above. Stipules 1 cm. long, setaceous. Leaflets about 19, broadly elliptical, 1 cm. long, apiculate, softly and sparsely pubescent with spreading hairs. Leaves 4-6 inches long. Pods about 3 inches long and 2 mm. wide, smooth, or ashy when young, straight. Plants shrubby below. I do not adhere to the dictum of "Once a synonym always a synonym".

Jepsonian Astragali. (See Manual pp.)

A. deserticolus, an impossible name is probably nutans Jones.
A. Preussii var. limatus is Crotalariæ Bth.
A. Kernensis is lentiginosus Dougl.
A. inflexus var. leucolobus (Jones) is a ludicrous blunder, for the plant is nearer the Purshii group.
A. atratus var Panamintensis (Sheldon) shows ignorance of atratus which is quite a different species.
A. agninus is aridus a variable species as to development of septum
A. Clarianus is one of the forms of the variable A. tener, which probably includes A. Rattani.

Jepson's figure of A. acutirostris Watson which is A. streptopus Greene does not show the oxytropidoid keel rightly nor the twisted pedicel, the cause of Greene's name.

Astragalus Mexiæ n. sp. No. 2563, Mexia from the rancho Colorado, Chihuahua, district of Guerrero Mex., May 27 1929 2200 meters alt. on sides of steep and dry ravines, in dry red gravelly soil. Prostrate perennials from a strong taproot. Plant related to A. parvus, but flowers not in heads. Stems many from the crown and racemosely branched throughout and with short and congested internodes, the whole about 6 inches high, with very many thin and delicate leaves about as long as their subtended racemes, appearing green. but minutely woolly with very short and appressed hairs. Leaves 2-3 inches long and with short and filiform petiole .5-1 inch long. Leaflets elliptical, about 6 mm. long, rounded at tip, 4-7 pairs, petiolulate, slightly more pubescent below, with stipules adnate to petiole and obliquely-triangular-acute and 2-3 mm. long and green. Racemes mostly

hroughout the plant and nearly sessile, 1-2 inches long, broad, with about 10 flowers subtended by relatively, large, green but ciliate bracts. Calyx white, loosely inclosing the floral parts as if inflated, obliquely cylindrical from a triangular base which has 1-2 bractlets at the oblique insertion, the tube a little arcuate because the lower side is concave and upper much arched, about 4 mm. long by 2-3 mm. wide and laterally flattened, the subulate teeth lax and about 2 mm. long. Banner narrow and much arched and with reflexed sides. Wings straight, narrow and a little longer than the keel.and often purple-tinged at tip. Keel very blunt and purple-tipped. Pods as ashy-puberulent as the leaves, slightly arched and shortly acute, about 2 mm. high and 6-8 mm. long, deltoid in cross-section and deeply sulcate dorsally to the middle, and with a complete hyaline partition to the ventral suture which is raised externally as a strong rib, smooth, sessile. Whole plant a mass of flowers. Named for Mrs. Mexia the collector.

Astragalus Coquimbensis (H. & A.) ReicheVol. 2 p 109 Fl. Chil. seems to be the same as A. Thurberi Gray and antedates it. A. candidissimus Ledebour is not the same as Watson's synonym which fact justified Greene's A. Miguelensis.

A. Crotalariæ Bth., A. limatus Sheldon was described as from Monterey by Coulter and led to much confusion by Gray, but it could not have come from there.

Hamosa manca Rydberg is A. Austinæ Gray as shown by the connate stipules.

Xylophacos lagopina Rydberg seems to be A. Pulsiferæ Gray A. Breweri Gray and filicaulis F. & M. are related,but not identical.

A Laxmanni Jacq. has been assumed to be the same as adsurgens Pall. and our nitidus but this cannot be for the pubecence is not fixed by the middle as in nitidus,

A. Mauretanicus Stev. and Parryi Gray seem related.

A. Mexicanus A. DC. seems to hold up on the calyx being inclined to be inflated and 6 mm. long, with deltoid teeth about 1 mm. long, and the tube being white-short-shaggy with hairs inclined to be felted, banner broad.

A. obcordatus is to be compared with A. distortus, but it has no sign of a septum as is shown by distortus at times, This group the Sparsiflori should come either near the Hamosi or distortus put in the Hamosi.

Hamosus Minthorniæ Rydberg is A. Congdoni Watson, probably, but the locality of collection very doubtful.

A. curtipes Gray is a very doubtful species of the Monterey, Cal. region, going up as far as San Francisco, and belongs in the puzzling leucopsis group and may be the same as A. Franciscanus Sheldon, a freak of leucopsis with connate stipules.

Allium hæmatochiton Watson was rightly named "bloody coat" from 'aimatos' bloody and "chiton" coat because of the lower scales being blood-red. The extra propagation is by the bulbs splitting vertically through the middle.

Phaseolus barrancæ n. sp. No. 27177, La Barranca, Guadalajara, Nov. 21 1930. Climbing high over bushes and robust, in rich soil. General appearance of Perytheuloma. Leaflets broadly elliptical to elliptical-ovate, 2-3 inches long by 1.5 wide, very venose below, velvety all over, entire, apiculately acuminate, half-cordate into a stout petiole 2-3 mm. long. Flowers an inch long, deep-purple and striate-veined, 3-5, in a short and short-peduncled raceme. Pods linear, much arcuate, immature, 2 inches long by 4 mm. wide, densely yellow-velvety, apiculate.

Desmodium validity does not seem much discussed for it was assumed to be antedated by Meibomia Adanson Fam. but no species were described in it till after Desmodium was proposed, and so the genus falls. Pleurolobia also antedated it but its type is an Æschynomene, which differs from Mimosa in the slim character of a partition between the joints of the pods, and now Hemsley and Rose come along and complicate things with Climacorachis.

Æschynomene Guadalajarana n. sp No. 27212, La Barranca, Guadalajara, Nov. 12 1930 and also No. 23052, La Barranca Nayarit 1928 A slender and erect shrub 4-6 ft. high with the thick stems very slender and racemosely branched, above with widely spreading branches and very slender racemes about a foot long. sparsely and minutely pubescent. Leaves odd-pinnate, 4-6 inches long, of about 30 pairs of narrowly-oblong, rigid leaflets 1 cm. long and venose and 2 mm. wide, obliquely-cordate at base, obtuse, but needle-pointed or awned, with midrib in the center Flowers in narrow and compound racemes, and with minute bracts Calyx pubescent, 2 mm. long and flowers 6 mm. long and purple and with smooth banner. Pods on a filiform stipe twice as long as calyx, joints 1-2, almost distinct, obliquely oval, each about 4 mm. long, smooth, venose, apiculate. Petals and floral rachis densely and minutely pubescent.

Erythrina flabelliformis Stdl. Standley does not describe the coral-colored seeds correctly.

Lonchocarpus capensis n. sp. No. 27259, San Jose del Cabo. Sept 14 1930. A big tree. Flowers in a raceme a foot long, lax, 1-1.5 cm. long. Leaflets straight but oblique at base on the lower side and inserted on the lower corner, blunt, apiculate, with an extra basal nerve on the upper side, smooth. pedicels 1-1.5 inches long. Calyx lobes 2-4, deciduous, oval, 5 mm. long, purple. Petals longer, purple. Pods fleshy, constricted mostly in two parts, 2-3-seeded, 2-3 inches long, somewhat flattened, stipitate and long-acuminate, hoary, 1 cm. wide. Petals strongly red-veined.

Peganum Texanum n. sp. Del Rio Tex. A low and prostrate herb a few inches long, and much branched from a woody base and with short internodes. Leaves ovate in outline and once to twice-pinnately divided into linear, acute and revolute margined segments, puberulent. Pedicels slender recurved, .5 inch long. Flowers yellow. Sepals about 7, linear-filiform and about .5 inch long, entire. Pods didymous, about .5 inch wide membranous, filled with the few, large, and cellular seeds, the 2 divisions of the pod seldom equal. This grows also at Eagle Pass and eastward in loose soil.

Helietta barrancæ n. sp. No. 27091, La Barranca, Guadalajara. Nov 19 1930. A slender shrub, 6-8 ft. high, openly and slenderly and alternately branched, growing in rocky places Leaves thin, 3-foliolate, low-crenulate-toothed, with terminal leaflet nearly twice as long as the rest, lanceolate from a cuneate base and on a petiolule 6 mm. long, the lateral leaflets oblique and nearly sessile. Flowers minute, in a compound raceme, purplish. Fruit normally a single obliquely winged carpel, though sometimes twin, 1 cm. long by 3-4 mm. wide, rounded and very flat, parallel-veined.

Phyllanthus peninsularis Brandg. No. 27542, Laguna mts. Sept 22 1930. The seeds are sharply triquetrous and with raised and chocolate-colored and zigzagg cross-markings.

Phyllanthus Galeottianus Baill., 274 94, Loreto, Oct 4 1930 This has nearly round and glossy-green leaves. Anthers dehiscing parallel to midrib. Flowers yellowish-green. It is quite distinct from peninsularis

Phyllanthus viridis n. sp. No. 27503. Cacachilla mts. Oct. 2 1930. A rigidly branched shrub 4-6 ft. high, with branches widely spreading, dark-gray, smooth, and the secondary ones almost spinose,, with alternate, oval, entire, thin, green leaves, smooth, rounded at tip and inclined to be cuneate at base, and on filiform petioles ⅓ the length of blade. Stipules triangular-subulate and red. Most of the branchlets aborted into warts having fascicles of slightly larger leaves. Flowers mostly single, on rather stout and half-inch peduncles. Pods smooth, about 7 mm. wide. depressed-globoss. Seeds chocolate colored, smooth and shining, lenticular, rounded on the back and flattened on the other side, without markings, about 4 mm. by 3 mm., rounded at the ends and a little narrower below.

Croton attenuatus n. sp. No. 27500, Cayuca ranch, Sierra Giganta, Oct. 23 1930. A very slender and widely branched shrub several feet high, with smooth and gray bark. Leaves scattered, 1-2 inches long, mostly rhomboidal-ovate with a cuneate base, and at least the upper ones abruptly long-acuminate, some of the lower ones triangular-acute at both ends, on a white-pubescent petiole .5 inch long. without evident stipules and glands, surface

sparingly stellate-pubescent. Leaves quite thin. Fruit terminal, of a single short staminate spike an inch long, with a few pistillate flowers at base. Pods 7 mm. high, depressed-globose, closely and finely stellate-pubescent. Seeds olive-colored. 4 mm. by 5 mm., oval, a little flattened on one side and rounded on the other, rather truncate below.

Croton crenulatus n. sp. No. 27499, Cayuca ranch, Sierra Giganta, Oct. 23 1930. A moderately stout and erect shrub with short branches, and smooth and gray bark, the young twigs yellowish-white with dense and pseudo-stellate hairs Leaves thickish, nearly oval, rounded to subcordate below, inclined to be a little triangular at tip but barely ever acute, crenulate throughout, rather densely puberulent below with soft hairs from a raised base in radiating clusters of 5-10 as if stellate but not really so. Pods rounded, densely puberulent, 12 mm. wide by 10 mm. high, mostly single and mostly sessile at the ends of the branches, the plants apparently dioecious. Seeds dark-colored, 7 mm. by 8 mm. and 6 mm. thick, about oval, but a little truncate below, ridged on the back some and sulcate on the face and a little flattened there. The Crotons of the Peninsula do not seem to fit anywhere but are sui generis.

Croton Alvaradonis n. sp. No. 27827. Trail down the Lagunas, Sept. 24 1939, Named for my guide, Alvarado, a grand old man. An openly branched shrub, with leaves clustered at the ends of the twigs racemosely. Leaves about 2 inches long, elliptical-lanceolate, acutish, inclined to be cuneate below, very strongly 3-nerved and with them ±sed below, finely spinulose serrate with the teeth ending in a cluster of hairs, felted-pubescent throughout, but with the upper surface dark, on stout petioles barely 1 cm. long. Fruits oblately globose or sub-didymous, finely and shortly felted and smooth, ¾ inch by ½ inch thick, single, with the very large seeds single in each cell and pictorially blotched and smooth.

Croton Boregensis n. sp. No. 27496, Borego ranch, Laguna mts, Sept. 20 1930. Allied to C. Magdalenæ Millsp., A shrub, 6-8 ft. high, openly branched and erect, growing in the shade of live oaks. Stems white-stellate-hoary, as are the petioles which are about an inch long. Leaves thin, cordate to cordate-ovate-triangular, shortly acuminate, obscurely and remotely dentate, softly pubescent, particularly below, with stellate and rather sparse hairs with the central hair elongated and with several very short ones at base. Leaves 3-4 inches wide by 4-6 long. Inflorescence terminal and with a long and linear staminate spike with 1 to few fertile flowers at base. Fruits globose, shaggy-hairy, about half an inch long. Seeds shining and inclined to be mottled along the center of the back, rounded at both ends, somewhat flattened, 8 by 4 mm., grayish.

Croton Blasianus n. sp. No. 23304, San Blas Sinaloa Jan 25 1927. A straggling shrub with smooth and nearly black branches, having many very short laterals about an inch long, and with several leaves nearly sessile and elliptical to lancolate and shortly acuminate, minutely serrulate, and with soft pubescence on both sides but appearing green, venose, 2-3 inches long. Pubescence equally stellate and short. Inflorescence a spike hardly an inch long and few-flowered. Fruits 1-2, spherical, 5 mm. long and vary shortly felted-hairy. Seeds as in C. Boregensis.

Tragia scandens n. sp. No. 23300 Guaymas, Sonora, Jan. 26 1927. I refer here also Purpus' no. 419 Ixmiquelson Mx. and Brandegee's no. 110760 from the Cape, and also Purpus's no. 110800 from Calmalli L. Cal. all in Cal. herb. Plants filiform climbers with ovate leaves barely acute and coarsely dentate, with cordate base, on a petiole 1 cm. long. Raceme short and filiform.

Bernardia Mazatlana n. sp. No. 22626, Mazatlan Nov. 20 1930, on hillsides among rocks. Herbaceous but stems a little woody below, about a foot high, spreading and much branched. Pistillate spikes terminal, oblong, .5-1 inch long, silvery-hairy, shortly and stoutly peduncled. Calyx lobes filiform. Staminate clusters narrowly linear and about an inch long, on filiform peduncles nearly as long, and opposite the leaves and below the pistillate ones. Leaves thin, broadly ovate from a truncate to subcordate base, an inch long, finely serrulate, low-veined and on a filiform petiole 1 cm. long.

It is remarkable that Standley omits all mention of seed markings in Euphorbia, crucial characters in some cases, in his Mexican woody flora.

Sebastiania sarmentosa n. sp. No. 27544. Primiera Agua, Sierra Giganta, Oct. 15 1930 and near Loreto no. 27545

Erect and racemosely branched herbs with rather woody base and about 3 ft. high and fleshy leaved. Leaves alternate, many, elliptical-lanceolate and shortly acuminate at both ends, triple-nerved, crenulate to barely serrate with uncinate tips. Whole plant smooth. Leaves 2-4 inches long. Flowers in axillary clusters about an inch long, small, red, with ovate bracts and with a single pistillate and pediceled flower below. Pistillate sepals triangular-acuminate and erose. Pods smooth, depressed, about 7 mm. wide, 3-celled. Seeds single in each cell, about 4 mm. long, globose-ovate and acutish at tip but rather cordate below, round in cross-section, obscurely rugose and roughened all over, chocolate-colored, about the shape and general appearance of Euphorbia heterophylla.

This is allied to S. bilocularis as understood by Brandegee, but the leaves are narrower and acute and the pods only about half the size and seeds very different. I do not consider the bilocular pod as significant for Tetracoccus and Jatropha vary in the same way.

Cuphea Watsoni n. sp. No. 4616 Pringle, Tequila, Jalisco, Mex., Sept 1893, Herb. Univ. Cal. No. 108086. A tall and erect plant 2-3 ft high, alternately and widely branched and slender annual, with long internodes. Stems, upper leaves, and inflorescence low-shaggy with abruptly spreading and glandular hairs. Leaves truncate-ovate to cordate-ovate, 1-2 inches long, on a stout petiole 1 mm. long, conspicuously feather-veined below and rather abruptly acuminate, very obscurely denticulate: upper ones somewhat reduced and lanceolate. Calyx 15 mm. long by 2-3 mm. wide and lanceolate, on a pedicel 2 mm. long. Upper petals exserted on a short claw and with blade about round and 4-6 mm. long, pink-purple. Flowers racemose and few. Other petals oblanceolate to linear and 4 mm. long. Growing in fields as do the other species.

Euphorbia corallifera n. sp. No. 27545, Cayuca ranch, Sierra Giganta, Oct. 23 1930. This belongs to the Poinsettia group, apparently near E. tricolor Greenman. A slender and erect shrub, Ephedra-like, widely branching, and with long and green leafless stems with internodes 2-3 inches long, and with a joint or two at tip with a pair of glaucous and rather leathery leaves about an inch long, and with oval to oval-rhomboidal flat leaves, entire and shortly acute at base and often at tip, on filiform petioles half their length. Leaves smooth above and only minutely puberulent below. Stipules rudimentary. Flowers in a very short cyme arising from the terminal pair of leaves, shortly pubescent throughout even to the rudimentary bracts which are a little lacerate. Glands round, red, prominent. Appendages ovate to rhomboidal, a little erose above, white or tinged with purple, nearly half an inch long, spreading. Pods depressed-spherical smooth, green, about quarter inch long, immature. Inflorescence sometimes compound. This is a very showy bush 6-8 ft. high.

Euphorbia Espirituensis n. sp. No. 27505, Espiritu Santo island near La Paz, Sept 29 1930 A straggling and very widely branched shrub with the lateral branches trailing, a few ft. high and intricately branched with long and very knotty twigs many abortive ones half an inch apart bearing little clusters of 2 or more rudimentary leaves which are 4-5 mm. long and about oval though a little oblique below and rounded above, thick, entire and smooth, on stout petioles half as long, and with conspicuon deltoid and red stipules. Flowers solitary, smooth, yellowish, small. Pods smooth. Seeds oval-ovate, acutish, slightly angled gray, smooth, with a trace of sculpturing on the sides. the shape and size nearly that of Preslii.

This might pass for Magdalenæ but appears to be a fair insular species.

Orobanche. In a recent brochure on this genus a European author, in commenting on my specimens in herbaria gives my name as E. J. Marcus though my labels are all printed with name in full so that there can be no excuse for error. How any careful man could make such a blunder is hard to believe unless he copied from some address-book, where it was given as "Jones, Marcus E" but even then, not excusable.

Herpestis macrantha n. sp. No. 43627, P. Coll. Herb., Colonia Juarez Chihuahua, Jones, Sept. 12 1903, 6000 ft alt in ditches by roadside. A creeping and rooting perennial with prostrate to ascending stems, acutely angled and a few inches high, smooth, with internodes shorter than the leaves. Leaves punctate and lanceolate and tapering into very short petioles, not auricled nor clasping, sparsely low-serrate above, about an inch long, little reduced above. Pedicels single in the upper axils, filiform, about an inch long, mostly slightly longer than the leaves. Calyx 6 mm. long in flower and 8 mm. in fruit, the two outer lobes oblong-ovate-acuminate, the others narrower and a little shorter. Corolla yellowish at least below and purple-tinged above, broad, a half longer than the calyx, with lobes flaring. Pods oblong-ovate equaling the calyx lobes, shortly acute. Seeds black, oval, faveolate.

Galvesia sessilis n. sp. No. 27410 La Barranca, Guadalajara, Nov. 21 1920. An erect and rathor shrubby plant, growing in rich slopes, 3-4 ft. high, cymosely branched above into long, linear, and dense short-leafy-bracted spikes a foot or two long and shortly and densely glandular-pubescent throughout even to the flowers. Leaves opposite throughout even to the uppermost floral bracts, sessile, almost clasping, oblong-ovate, shortly-acute, coarsely serrate, 2-3 inches long by half as wide, venose, thick, lower floral bracts 1 cm. long, smaller above, sharply serrate, ovate and persistent. Calyx 6 mm. long, teeth deltoid, nearly half the whole, green. Flowers red, almost sessile,(pedicels 1-2 mm. long) ascending, 2 inches long by 5 mm. wide, split ⅓ the way down, with the lower lobes a little flaring, slightly wider above. Filaments of the two long stamens wider above and densely bearded on one side, the other stamens abortive and filaments shorter. Pods oval-ovate, 8 mm. long, black, abruptly and sharply acuminate, not oblique, filled with the oblong seeds which are truncate at both ends, 1 mm. long and a little wider above and with a conspicuous honeycomb coat with the cells in longitudinal lines going clear through the coat which is about as thick as the seed itself. Seed character quite different from the other species and from Castilleia.

The following Salvias were submitted to Prof. Carl Epling of Univ. Cal. Los Angeles branch who has specialized on t he Labitæ but who follows the Vienna code, as I do not.

Salvia–Calosphace. —PURPUREÆ.

Salvia Marci Epling n. sp. No. 27298. Arroyo Undo rancho prope Loreto, Baha Cal. e Jones lecta constituta est; typum in herb. Univ. Calif. (Los Angeles) vidi. Frutex pulcher amabilis, ramis incano-tomentellis, internodiis 2-4 cm. longis; foliorum habitu Monardæ mollis, laminis 8-10 cm. longis late lanceolatis ad apices acutissimos gradatim angustatis in basi rotundatis, marginibus serratis, pagina superiore virido inferiore pulchra incana ambobus præsertim inferiore mollissime tomentellis, petiolis 1-2 cm. longis, elatis; floribus 6-12, in verticillastris approximatis dispositis; calycibus florentibus 8-9 mm. longis extus incano-tomentellis labiis obtusis brevibus in maturitate non visis: corollarum purpurearum tubo 18-20 mm. longo ad basem valde abrupte angustato invaginato, labia inferiore quam superiore galeoto breviore: staminibus in galea inclusis. Nov. 26 1930. Etiam Diguet, sine loco

GLAREOSÆ.

Salvia emaciata Epling **n. sp.** No. 744 Hartman. Chihuahua in locis humidis prope Pilares lecta constituta est; typum in herb. Univ. Cal. (Berkeley). Isotypos in herb. Kew et Gray vidi. Herba annua, gracilis, tenella, altitudine ad 35 cm. utrimque fere glabra tenuissime hirtella, ramis erecto-ascendentibus, internodiis 3-6 cm. longis: foliorum laminis oblongis 2-3 cm. longis, 5-8 cm. latis, obtusis, in basi ad petiolos 5-10 mm. longos angustatis: floribus sæpius solitariis rarioribus binis in verticillastris bracteis perstatis 3-6 mm. longis elliptico-lanceolatis ciliatis subtentis, glomerulis inter se 1.5-3 cm. distantibus; calycibus florentibus 8-9mm. longis, in maturitate paulo auctis; corollarum tubo 5-5.5 mm. longo, labia superiore subfalcata, 4-5-5 mm. alta inferiore 6-7 mm. longa, lacinia media cordata. Inter Rio Chico et Rio Cabello, Sierra Madre Sept 29 1911 Barlow, Soldier Canon Sierra Madre 6500 ft. alt. Sept 16 1903 Jones et Colonia Juarez Jones.

EUSIGMOIDEÆ.

Salvia palmæ Epl n. sp. No. 380 Jones, prope La Palma Jalisco Mex. lecta constituta est typum in herb Coll. Pomona, isotypum in herb. Smithson. vidi. Herba innocua altitudine 40-60 cm., caulibus e caudice lignoso ascendentibus sparse pubescentibus vel cum pilis extensis glandulosis conspersis: internodis irediis 3-8 cm. longis: foliorum laminis 2.5-4 cm longis, 18-25 mm. latis, ovatis, in apice obtusis, in basi rotundatis, petiolis 3-6 mm. longis elatis, margine irregulariter crenato-serrata, paginis ambobus hirtellis: floribus3-6 in verticlllastris bracteis caducis parvis subtentis, glomerulis inter se 1–4 cm. distantibus in spicis interruptis 20–40 cm. longis, gracilibus, laxis, dispositis: calycibus florentibus 5.5–6 cm longis, extus hispidulis, in maturitate 8 mm. longis; corolla–

rum 6 mm. longo; labia superiore 3 mm. alta, inferiore 8-9 mm. diam.

MEMBRANACEÆ(ESCHOLTZOIDEÆ).

Salvia verecunda .n sp. Epling In montibus Sierræ Madris Mex. in canone Guavnopæ lecta constituta est; typum in herb. Coll. Pomona vidi. Herba perenne, parva, verecunda; caulibus ascendentibus, 20-30 cm. altis, hirtellis, foliorum laminis deltoideo-ovatis, 2-4 cm. longis, 1.5-2.5 cm. altis, in apice acutis, in basi subtruncatis: petiolis .5-1 5 cm. longis, elatis, margine crenato-serrata, paginis ambobus viridis et hirtellis; glomerulis inter se 1-3 cm. distantibus, bracteis viridibus ciliatis subtentis; calycibus florentibus 6 mm. longis extus ad basim minute glandulosis et pilis longioribus, setaceis, sparsisssme conspersis in maturitate fere glabris paulo auctis: corollarum tubo 4 mm. longo. intus nudo, labia superiore 2.5 mm. alta, inferiore 5.5 mm. longo.

Hyptis decipiens n. sp. No. 27299, Triunfo L. Cal Oct. 6 1930. Allied to H. laniflora, erect shrubs 3-6 ft. high. with stems ending in open panicles. Whole plant appearing smooth except the white woolly panicles, but leaves puberulent on the raised nerves below, and roughened on the upper side with minute hairs. The pubescence throughout consists of rather long-stalked hairs branching at tip into a stellate-appearing mass, but really the branches are alternate. The pubescence of the panicles is densely-white, very close, and not woolly, all the parts from calyx to peduncles about equally white. Leaves ovate to lanceolate, cuneate into the petiole, 1 cm. long, mostly acuminate at tip, obtusely crenulate, reduced above, those of the panicles about an inch long and elliptical. Panicles a foot or two long, open, of many ascending branches with regular pairs of clusters, each on a peduncle .5-1 inch long. Clusters umbellate, of about 25 flowers on short pedicels about as long as the 3 mm.-long calyx and with filiform lobes half the whole. Corolla not over 5 mm. long, purple.

Sphacele hastata Gaay. Ivan Johnston in his flora of the Revillagigedo islands speaks of the vile smell of the plant. I can say that it was infested with a cloud of hummingbirds all dry in the Lagunas and that I did not observe any bad odor. It covered an acre there and was apparently at home. I also saw it on the trail in 1928 on the east side of the range. It may have been introduced.

Micromeria Brownei var pilosiuscula Gray of Texas has oblong-ovate nutlets, 2 mm. long and rather triquetrous with rounded back and conspicuously white-mottled.

Lippia barbata Brandg. This species requires a better description than the one given. My specimens from the Cayuca ranch in the Sierra Giganta form an openly branched shrub 4-6 ft. high, with gray bark, and leaves clustered at the ends of short branches. Whole plant very rough-pubescent throughout even to the small flowers. Hairs appressed from a pustulate base. Leaves thick and leathery, raised-pinnate-veined, 2-3 inches long, ovate to lanceolate-ovate, acute, low-and bluntly-crenate, very shortly-cuneate into the very short petiole, nearly equally pubescent on both sides rarely oval-ovate and obtusish. Flowers apparently dicœcious, white, the fertile ones in dense and ovate heads(at first) about an inch long and as long as the peduncles, the flowers themselves being barely as long as the ovate and overlapping, green and obtuse bracts, 8 mm. long and rather densely short-pubescent. The whole floral cluster is not exserted beyond the leaves. At maturity the 5-nerved bracts disarticulate about 1 mm. above the rachis and fall off, the stout pedicels are articulated to the top and cup-shaped and about 1 mm. long and remain on the rachis which is about as long as the peduncle. Heads single in the axils. The fruits are globose and about 2 mm. long and conspicuously white-hairy, the hairs spreading in all directions and as long as the body Staminate flowers in open and inconspicuous greenish clusters, with the oblong bracts half as long and about as long as the proper tube of the flowers. Flowers funnelform on the upper half and with spreading and rounded lobes.

Euphorbia multifoliosa n sp. No. 27517, La Barranca, Guadalajara, Nov. 17 1930. Plant apparently allied to E. pycnanthema Eng. Prostrate annuals, forming dense plaques. Internodes short, but little longer than the leaves below, but with leaves overlapping above and particularly so on the branches where they are much shorter and smaller. Normal leaves about an inch long by half as wide, rather thickish, palmately 4-nerved, barely serrulate above, conspicuously oblique below, sparsely short-woolly-hairy and becoming smoothish with age, grayish, with a minute petiole as woolly-hairy as the stems. Flowers red, a solid mass backed by smaller leaves, and with each flower sessile in the axil of a bract about its own length. Appendages red and fimbriate on the margins and with the lower pair elongated so that the flower seems horseshoe-shaped. Pods densely woolly, barely exserted, small. Seeds 1 mm. long, oblong-ovate, acutish and a little oblique, rather acutely 4-angled with flattish (not grooved) sides, and conspicuously 4-6-ribbed with broad cross-ribs and filiform grooves between, not punctate nor warty, with angles a little notched. The plants remind one of pilulifera, but seeds different.

Euphorbia bilobata Eng. has warty seeds in all forms

Euphorbia longepetiolata n. sp. No. 27514a, La Barranca, Guadalajara, Nov. 12 1930 and same loc. No. 27538 Annuals, erect and widely branched, with long internodes and deeply sulcate branches. Leaves opposite, 2-3 inches long, very thin, 1-nerved, entire, elliptical-lanceolate-acuminate, the blades 1-2 inches long, with petiole half as long and filiform. Flowers few, in the axils, white, petaloid appendages minute. Pods smooth and glaucous. Seeds about 1 mm. long, about oval, with 3 lines of transverse and quadrangular pits, black or olive-colored, acutish. waste places in fields. This is also like E. Francoana Boiss. but inflorescence different. E. graminifolia is similar.

Euphorbia tenuissima n. sp. No. 27514, La Barranca, Guadalajara, Nov. 25 1930. Allied to E. subreniformis W but leave oval to rhomboidal-ovate, very thin, opposite, pennate-nerved, entire, smooth, on capillary petioles, the lower ones about an inch long and the upper ones 1-2 mm. long. Flowers single in the upper axils, greenish, very small, with veay short and whitish appendages entire and rounded, and with the bracts never acute but always small. Pods sharply acute. Seeds oblong and rounded at both ends, and a little flattened, but rounded on the corners, and shallow-pitted in vertical lines, not angled. A weak and erect and almost capillary annual, easily mistaken for subreniformis. About a foot high and openly branched, Seeds pectinately warty and pitted.

Many species at times have the stamens exserted and anthers didymous, with each lobe about spherical.

Euphorbia pseudoserpyllifolia Millsp. seems to be perennial At least all my speimens are slightly shrubby below. The seeds are narrowly oblong, acutish, reddish, deeply grooved longitudinally and without cross-wrinkles or warts. There is a large group of species with similar grooves.

Croton Lagunensis n. sp. No. 27827, Trail down the Lagunas, Sept 24 1930. An openly branched shrub about 6 ft high, with gray bark, much branched and with short and leafy branches. Leaves 2-3 inches long, thick, elliptical, sharply low-serrate as if glandular, and with teeth having a tuft of hairs at the ends, a trifle more acute at tip than base, densely white-stellate below and appearing as if greener above, but yellowish and with pubescence more compact, pinnate-nerved though the basal pair of nerves a little more prominent, on a stout potiole 1 cm. long. Fruits on stout pedicels 1-2 cm. long, mostly single and terminal, 12-15 mm. wide, densely white-stellate, always 2-celled and didymous, the two halves are 8 mm. wide and would be spheres except for the flat commissure. The pods have a double ridge down the sides to the middle through which they split and continue to the base. The seeds are gray, mottled, and conform

to the external shape of the pods and are ½ mm. shorter than the cells. This has the habit of C. Magdalenæ Millsp. but grows at higher elevations in the same life zone.

Jatropha spathulata Muell Arg. seems to have two marked forms, one with globose pods is rare, the other has didymous pods and spherical seeds half as long as the usual form. I do not consider the var. sessiliflora M. A. as valid. My no. 27506 from the Cape with knotted stems is the common form. No. 27504 from the Borego ranch is less knotted and with longer leaves. No. 27507 from Triunfo is not knotted. There are constantly forms with only 2-celled pods that are confusing.

Jatropha decipiens n. sp. No. 27828, La Barranca Guadalajara, Nov. 25 1930. A tall bush 6-8 ft. high, with long and slender branches and short panicles in the upper axils. Leaves 4-5 inches long, smooth, entire, elliptical, shortly cuneate below into a stout petiole 1 cm. long, abruptly triangular-acuminate at tip, thin, feather-veined, opposite. Fruits fleshy, yellow 1-1.5 cm. wide and 1 cm. long, either globose and single seeded or 2-celled and somewhat didymous. Seeds either spherical or conspicuously flattened on the commissural side. Inflorescence a cluster of racemes from a very short common base.

Buddleia corrugata n. sp. Co. 27361, Arroyo Undo, Sierra Giganta, Oct. 26 1930. A slender and openly branched shrub a few feet high, with dark bark and white-woolly-stellate twigs and leaves. Leaves 1-2 inches long, reticulate below, deltoid-cuneate below into a very short petiole, coarsely and strongly few-toothed very obtuse, oblong-ovate, in about 3-4 pairs on the short season's twigs. Flowers few, in small and sessile heads arranged racemosely at the ends. Heads 23. Flowers very small.

Loranthus anomalus n. sp. No. 27330, La Barranca, Guadalajara, Nov. 17 1930. An olive-green shrub 2-3 ft long, with woody stems and filiform branches, with scattered, smooth, and entire leaves, 2-3 inches long, shortly acuminate at both ends and on slender petioles 1 cm. long, leathery but becoming thin. Flowers diverse. The lower ones in racemes and on pedicels about 4 mm. long; the others in catkins an inch or less long which are racemose on the main rachis. All flowers seemingly fertile.

Mortonia aspera n sp. No. 27502, Arroyo Undo, Sierra Giganta, Oct. 26 1930. A rigidly branched but not spinose shrub 4-6 ft. high, with dark brown bark becoming grayish-striate on the pubescent twigs. Leaves alternate and inclined to be fascicled on low warts, about an inch long, nearly oval but with short and very pubescent petiole. Leaves yellowish, thick, 3-nerved, entire

but seemingly inclined to be wavy on the margins, very much rounded at tip and rarely a little retuse, minutely papillose with clusters of raised and shining cells which become elongated and concentric in the center surrounding a stout, erect, and tapering hair. Fruits yellowish to orange-colored, fascicled on the warts oval, apiculate from the stout remains of the 2-lobed stigma, a little sulcate between the seeds, 2-celled, 2-seeded, indehiscent, puberulent, on stout pedicels their own length, spreading, 7 mm. long by 4 mm wide, a little flattened at the sutures. This would pass for Colubrina glabra Wat. which is a very variable species but the fruit and pubescence are different.

Dodonæa Lagunensis n. sp. No. 27087. The Laguna Laguna mts., Sept 24 1930. A slender shrub 6-8 ft. high. Leaves oblong-lanceolate, apiculate, entire, 3 inches long, nearly an inch wide, finely feather-veined, tapering into a short and margined petiole 6 mm. long, shining and appearing as if waxy, very minutely pubescent, clustered at the ends of the branches. Clusters of fruit almost sessile. Peduncles nearly 1 cm. long, filiform. Fruit deeply emarginate above and below, 1 cm. high, about 1.5 cm. wide, smooth, rather few in the clusters. This belongs in the Jamaicensis group.

Vitis peninsularis n. sp. No. 27150. Laguna mts., Sept 22 1930, 6500 ft. alt., growing high on Pinus cembroides. Leaves cordate-ovate-acuminate, about 3 inches long, smooth above, velvety-pubescent below and somewhat hoary. Fruit blue-black nearly 1 cm. wide, fruiting copiously. Tendrils stout, petioles about an inch long. Leaves regularly low-serrate and with teeth ending in sharp prickles ¼ mm. high and callused.

Condalia Parryi Gray has chrome-yellow fruits 1.5 cm. long by 1 cm. wide, round and smooth in cross-section, elliptical, rather acute at both ends, triangular-apiculate at tip, the pulp of pod 1-2 mm. thick, sweetish and a little bitter, seperating readily from the smooth seeds which are chocolate colored and obliquely beaked at both ends and a little flattened and with traces of two sharp lines along the sides, the walls are very bony and hard and 2-2.5mm thick and reddish, with 2-3 seeds in each cell, which seeds are round The pedicels are about ¾ inch long and mostly single in fruit. The fruits fall quickly at maturity. The bushes are 6-8 ft. high usually and much branched and green.

Abutilon barrancæ n. sp. No. 27162 La Barranca, Guadalajara, Nov. 19 1930. A slender shrub 3-6 ft. high with nearly simple stems ending in a narrow panicle. Stems shortly-pubescent with rather long stellate hairs from a pustulate base and inclined to be glandular on the inflorescence. Leaves many, 4-6 inches long, 7-nerved, ovate-acuminate to ovate-lanceolate-acuminate, somewhat cordate below, on stout petioles an inch long, with nerves raisod below, softly pubescent below with long-rayed

stellate hairs, nearly smooth above and with surface appearing as if scurfy, with veins impressed. The stout pedicels ascending and jointed near the tip, half an inch long. Flowers pale-yellow and with rounded petals about 1 cm. long. Calyx rather rotate-spreading in flower, with lobes triangular-ovate-acuminate and about 8 mm. long, stellate-pubescent as are the carpels, about as long as the fruit. Fruit depressed-globose and truncate at tip. Carpels 2-seeded, about 10, minutely beaked at the blunt tip, 8 mm. long. Seeds angular, barely puberulent. Leaves low-crenate.

Sida rajoides n. sp. No. 27163, Primiera Agua Sierra Giganta Oct. 19 1930. A slender and erect bush 3-5 ft. high racemosely branched above, the whole upper part becoming a compound and leafy panicle. Whole plant minutely and velvety-stellate-pubescent even to the fruit. Leaves ovate, from a truncate to cordate base, thick, 2-4 inches long, gradually reduced above, obscurely and doubly crenulate, 7-nerved from the very base and with veins conspicuously raised below and impressed above, barely acute. Flowers umbellate, 2-5 on the ends of a common peduncle an inch long and arising opposite a leaf, and at tip bracteate with linear and caducous bracts 1 cm. long. Each flower on a filiform and reflexed pedicel an inch long in fruit. Calyx lobes lanceolate-acuminate, 8 mm. long, not enlarging in age. Petals purple, fan-shaped, about 1 cm. long and much exserted. Fruit rhomboidal, about 1 cm. long and wide, papery, 5-celled (cells 1-seeded), splitting through the junction of the valves and not through the back and valves explanate at last. Fruit conspicuously winged at the junction of the valves and just below.

Sida stenopetala n. sp. No. 27142, La Barranca, Guadalajara, Nov. 16 1930. Annual and erect and slender plant racemosely branched above in an open panicle. Basal leaves triangular-ovate-cordate, the blades 2-3 inches long, green, sparsely stellate-pubescent on both sides, passing gradually into linear ones above which are entire and hastate-lobed below, with the ears 1 cm. long and deflexed, root leaves crenate. Panicles very open and diffuse with elongated branches and the filiform peduncles 1-3 inches long. Calyx about 5 mm. long, with triangular lobes half as long, not enlarging in fruit. Flowers very narrow, an inch long, purple, with the petals separate and conspicuously stalked oblanceolate, 8-9 mm. long. Staminal column exserted as in Kosteletzkia, 2-4 mm. long. Anthers didymous and with a conspicuous white connective between the cells. Fruit about 8 mm wide, of about 10 carpels which are hispid at tip and truncate, and cared on the angles. Seeds black, truncate at tip, with the arched back flat or a little grooved along the middle and rugose, with the sides concave and plane. One would naturally place this in Kosteletzkia but the fruit characters are those of Sida. The flowers are very dark colored.

Sida rajoides. Add to description,

junction of the valve just below the middle where it is 4 mm. wide and narrowing toward each end. Fruit strongly beaked, the beak 4 mm. long, and at last splitting into 5 needle-like awns Seeds blackish, about 2 mm. long, half oval, rather pointed at both ends and longitudinally and finely striate-pitted. Pods conspicuously exserted. At first one is inclined to take this for a Waltheria for it has that habit. Nos. 27170 from east of Loreto and 27166 from the Cape.

Hermannia Palmeri Rose reminds one of Hibiscus and Triunfettia, but the 5 linear-lanceolate anthers opening by pores at the tip prevent its being in either genus. The anthers are described as connivent, but they are not. The oval fruit is covered with hair-like barbs with reflexed hairs on them and with the tip anchor-like with half a dozen sharp arms reflexed and radiate. The flowers are conspicuous and yellow.

Helianthemum glomeratum Lag. is quite common at the Laguna, growing on the open plain, and is a tufted shrub about 2 ft. high, appearing like an Œnothera when in bloom. It seems too near to H. Canadense.

Hybanthus peninsularis n. sp. East of Todos Santos at Borego ranch and at Cayuca ranch, Oct 23 1930. A tufted perennial 2 ft. high, inclined to be shrubby below, racemosely branched throughout, and with weak and herbaceous stems, ashy on young parts with short and incurved hairs as if minutely woolly. Leaves roughened on the ribs, lanceolate-acuminate, coarsely toothed, variously cuneate below, narrower above thin, on a petiole 1 cm. long, 2-3 inches long. Flowers in short terminal racemes, and single in the axils of reduced leaves, on pedicels 5 mm. long, spreading, dull-white. Calyx lobes elliptical and acute and inclined to be lanceolate, 2 mm. long and as long as the globose pods, ashy, hyaline on the margins and green in the center and 1-nerved. Petals white, barely as long as calyx, with the V-shaped blade-like apex. Pods rather oblate, smooth, green and pointless, 3-valved with smooth, large, light-yellow and triquetrous seeds

Lechea depressa n. sp. No. 27117. The Laguna, Laguna mts., Sept. 22 1930. Plants growing in rocky places under rocks in tufts about 4 inches high. Stem innumerable from a thickened crown, fillform, the upper half becoming an open panicle of compound racemes, the flowers of which come out opposite but below the corresponding and green bracts. Leaves imbricated, very many, bisulcate below, 5 mm. long. linear, acute, appressed-strigose-hairy, as is the calyx. Flowers chestnut-colored, with the petals not exserted, and the many stamens barely so and with didymous anthers. Fruits globose, 2 mm. long, with the valves splitting away from the erect partition and leaving the vertical and obliquely-ovate seeds single in each cell. This

species is manifestly near to L. minor which has the same pubescence.

Mentzelia barrancæ n. sp. No. 27101, La Barranca, Guadalajara, Nov. 15 1930. Plants resembling M. Conzatii Greenman. Shrubby, with brittle stems erect or nearly so but spreading and openly branched. Pubescence throughout minute, but inclined to be hoary, of simple but very warty tapering and appressed hairs. Leaves lanceolate from a nearly truncate base, doubly and laciniate-serrate, 2-4 inches long, long-acuminate, thin, the upper ones inclined to be opposite, all on short petioles. Flowers light-orange-yellow, nearly 2 inches long. Sepals filiform-subulate, 1.5 cm long. Petals oblanceolate. Pods oblong, 1 cm. long. Seeds few, oblong and rugose. Stamens many, with filaments about an inch long.

Cereus pecten-aboriginum Wat. So far as I can see, this is a form of Pringlei Wat. The description of the flowers tallies and the fruits are the form with fasciated areoles, The species near Guadalajara has somewhat less ribs but it is hardly probable that there can be two species with the same pods and flowers as in Pringlei. I incline to think that the ripe fruit of Pringlei would be edible when the spiny coat is stripped off. There is a kind of fasciation in Cereus where there is an elongation of the spines which the natives call "viejo" old man, whiskered cactus. Growers say this occurs only on flowering twigs, a fact that I doubt. I regard it more like a cancerous condition. It is most common on C. Schottii, but appears on the cardons which they call the big Cerei. The opposite condition occurs on C. Pringlei, absence of spines which led Britton and Rose to propose C. calvus which name they abandoned later on as not good, but which I think should be retained as varietal for the great Loreto form **Cereus Pringlei var. calvus**. These trees are gigantic, reaching 40 ft. high and having a trunk 2 ft. thick and with 20 to 30 branches each a foot thick.

The flowers of Pringlei are 3-4 inches long and stout and thick, black-purple without and white within and grow near the tips of the stems on the south side and the fruits form a great chestnut colored burr 4 inches wide.

Cereus gummosus has the long and tapering flowers of the night-blooming class and probably opens at night for it is open in the morning. The stems are decumbent and rooting near the sea but straggling upward in the interior. The fruits are pear-shaped and spinose till maturity when they turn purple and the spines fall off leaving the juicy and edible pear 4 of which make a meal, They call it "petaiya agria" at Loreto It blooms all the year but flowers and fruit are scarce.

According to Bacigalupi in Cont. Gray Herb. 95 21 my Cuphea Wrightii is a good new variety (nematopetala Bac). It is my no. 35 of the 1884 collection which is the same as my no. 24989 from Ramsey canon Ariz. distributed as C. Palmeri.

Œnothera Berlandieri Spach appears to be a good species of the Tropical life zone below Laredo Texas, but is placed as a variety of speciosa by Munz in his revision. It grows only in the Tropical, forming large mats 20 ft. or more in diameter and has pink-purple flowers, while speciosa has white and seems to be a winter annual, though plants cultivated here as speciosa are perennials. Speciosa covers many square miles in the Lower Tropperate as a winter annual.

Cymopterus purpurascens Jones was supposed and intended by me to be the same as C. glomeratus var. purpurascens Gray in Bot Ives and was fully described by me, but pupurascens and purpurasceus are not identical words and for that reason my name must stand for the species and not Rose's substitute. At the time of publication I did not know that there was a difference.

Deweya, Velæa Arracacia, Tauschia and Drudeophytum.

Rose takes up the older Velæa for Deweya in his first revision, in the second relegates Deweya to its type, argnta, and creates Drudeophytum for the other species, and apparently without good reason.

McBride combines them all in Tauschia along with Arracacia. That the genera are all closely related is evident, but their place in the family was not attempted. A close study of Arracacia Brandegei in the field in 1930 shows its relationship to Osmorhiza. I incline to think that Deweya and Tauschia may be congeneric and possibly some Arracacias should go to Tauschia but I propose keeping up Arracacia. This genus as I understand it has thin leaves, spinulose on the margins, and corky and raised ribs on the almost cylindrical fruits, in cross section, the commissure being very narrow and with a single oil tube in the intervals, 2 in all, and without angles at the junction of the commissure with the face. Tauschia has a tendency to have leathery leaves and is destitute of corky and raised ribs. Drudeophytum has no standing.

Arracacia Brandegei **var. sylvatica n. var.**

Typical Brandegei is a plant of the Tropical hills of Magdalena Island and goes up to the upper limit of the zone in the Lagunas. The plants are coarse and tall, 3ft. or more high with hollow and inflated stems and very large and coarse leaves mostly in a rosette at the base, with ovate leaflets cordate to rounded at the base and 2-3 inches long, and finely spinulose-serrate, but thin. Flowers described as purple, but normally yellow. The

variety has stems as slender as Osmorhiza nuda and are either erect or decumbent and widely spreading. The basal leaves are ternate and with divisions pinnate into 1-5 pairs of long-acuminate leaflets cuneate at base and inclined to be doubly spinulose-serrate and 1-3 inches long. The fruit is oval-ovate to linear-elliptic and 1 cm. or less long, almost cylindrical in cross-section, and smooth. The roots, unlike those of Osmorhiza, are fleshy-woody and coarse, large, and vertical. It has the same almost capillary rays much elongated, and the involucre is wanting as a rule, but sometimes is represented by a short leaf, mostly of 3 leaflets. The flowers are yellow. The whole habit is that of Osmorhiza, and it grows in the shade of pines and liveoaks on the top of the Laguna mts., Sept 22 1930, No. 27071. Typical Braudegei, my No. 24152 from the eastern slope in 1928 is very coarse and large, growing in damp places, in the open in the upper part of the Tropical and below the liveoaks, one would consider distinct but there are intergrades.

Arracacia Tapalpæ n. sp. Type in Pomona coll. A low plant with the habit of Tauschia nudicaulis and about the same hight, and, like it, widely spreading, with similar leaf-sheaths on the upper leaves (inflated and with winged petiole), and with the same (3-4 pairs) number of leaflets, but leaflets rather narrowly ovate, acute, and incised instead of oval-ovate and minutely crenate and obtuse, about ½ inch long. Flowers yellow. Umbels simple as in nudicaulis, without involucre or sometimes with a leaf-like one. Rays hardly 1 cm. long, rather few. Involucels of several lin ear and blunt bracts as long as the pedicels and green Fruit broadly oval-ovate, 5 mm. long by 4 mm. wide, acutish much rounded and with thick, corky and raised ribs Field notes. Plants growing singly from a tapering taproot 6 inches long and ¼ inch thick at tip. Got at spring in wet soil under trees close to foot of mt. about 200 yds from Ferreria de Tula Tapalpa mts. Jalisco 35 miles north of Sayula at 7800 ft. alt. Old leaf petioles at crown noneor very few and papery, wit the earliest leaves reduced to sheaths an inch long and with or without minute leaflets at tip At fruiting time the stem is not over an inch long and is erect, but the root does not reach the surface, so that the stem on coming to the top branches out flat on the ground with the first peduncle leafless and 1-4 inches long and prostrate or a little ascending and with tip usually erect. In fruit the peduncles seem to stiffen and be more erect. At the point where the first peduncle starts is a large and mostly green sheath like the first leaves and usually has 2-8 incised leaflets at the end but alway short and small, from the axil of this leaf come 1-2 peduncles always centrifugally with simleaf-bracts in the middle. These are occasionally again 2- or rarely 3-branched and all but one leafy bracted. One would think that this kind of development would lead to an indefinite growth, but none of my plants are over 4 inches high. There are no other stem

leaves than these bracts, but the root leaves are often half a dozen and 3 inches long, with proper petiole shorter than the sheath and with about 6 pairs of distinct and ovate to lanceolate leaflets with a cuneate and generally sessile base. These leaflets are never a third inch long and are doubly and irregularly serrate toward the tip where they pass into variously cut and lobed sections, the teeth are callus-tipped. Flowers yellow. Involucre none, represented by a ring of short and woolly hairs which is found at the base of all leaf-bracts on the stems. The young fruit broadly ovate and would be oval were it not a little contracted at tip, 3-4 mm. long, with broad and rounded corky ribs, shallow and widest in the middle

Spermolepis divaricata (Walt.) Raf. Neog. 2 1829. I note 2 blunders of Coulter & Rose on page 87 of their monograph. The genus is feminine and not masculine, and Britton was not the author of the combination.

Apium depressum n. sp. No. 82793 Pom. Coll. Herb. Lake near San Miguel Zacatecas Mex. May 6 1892, Jones. A depressed and apparent winter annual a few inches high, either stemless and with leaves and peduncles congested at the root or with short and decumbent stems and long peduncles. Leaves tripinnate, with final segments linear and strongly 3-nerved, 6 mm. long. Fruit oblately round, rather truncate at the end, the 2 seeds appearing as half-oval, with equal corky ribs and smooth, about 1mm long, manifestly allied to A. repens.

Bumelia cuneifolia n. sp. No. 27850, Arroyo Undo, Sierra Giganta, Oct. 26 1939. Leaves fascicled in knots and with single flowers on pedicels 1 cm. long. Leaves 1-2 inches long, spatulate, with rounded tip and slightly petioled, seemingly smooth but minutely puberulent, gray, with veins barely visible. Thorns few and short. This would be taken for B. reticulata Brandegee but leaves very different. A low and rigid shrub with dark bark.

Parsonsia dispersa n. sp. No. 27398, La Barranca, Guadalajara, Nov. 25 1930. Allied to Cuphea Cuarnavacana Rose and glandulosa Jones. An erect annual and widely branched into filiform branchlets, long-hairy-black-glandular throughout. Leaves very thin, elliptical-lanceolate-acuminate, about 3 inches long, minutely crenulate, truncate to cuneate into a short petiole, many. Upper internodes short. Flowers few and in racemose clusters, about 1 inch long, conspicuously spurred and strongly green-striped calyx black-hairy on the stripes. Petals bluish-purple, oblanceolate, long-clawed, nearly 1 inch long. Seeds rounded-oval and 3 mm. wide, strongly margined, dark and mostly mottled, flat. peduncles ¾ inch long, ascending and with flowers reflexed. In fields, showy.

Parsonsia purpureocalycis n. sp. No. 27148, mts. east of Loreto on mesas Oct 17 1930. Plants allied to P. microcephala and ternata apparently. Rather tall and slender, probably shrubby below, 3-4 ft. high and erect. Rough-pubescent throughout to even strigose on the young parts and calyx with white and ascending hairs, the larger hairs with pustulate base surrounded by a circular row of cells, the raised nerves of the leaves consist of several parallel cells. Lower leaves lanceolate, sessile, about 3 inches long, entire, acute, penninerved and with nerves impressed above and raised below, shining though minutely roughened, not glandular, reduced above. Branches racemose, ascending. Flowers rather racemose above, not truly axillary, ascending on stout pedicels about 4 mm. long. Pods oblong, 1 cm. long, truncate, paper-walled. Seeds flat, smooth, purple-mottled and about 2 mm. wide, round but truncate to a little cordate at both ends. Calyx 2 inches long by about 4 mm. wide, not spurred below but truncate, a little wider, black-purple except at base Calyx lobes deltoid, very hairy. Petals deep-orange, slightly exserted.

Parsonsia P. Brown Hist. Jam. 199 t. 21 1756. On p.1014 of his Shrubs and Trees of Mexico Standley gives Adanson Fam. 2 234 1763 as the place of origin, but had he looked up his citation he would have seen that Adanson quotes Brown as the author.

Gonolobus rotundus n. sp. No. 76076 Pom. Herb. Mound Valley Sierra Madres Chihuahua Sept 26 1903 Jones, at 7000 ft. alt. on prairies. Prostrate and spreading and filiform stems nearly simple and 1-2 ft. long. Internodes short so that the leaves overlap Leaves cordate-oval .5- 1.5 inch long, very obtuse, veiny, 7-nerved at base, smooth except for strigose hairs on the veins and stems. Pods smooth, about 3 inches long by an inch wide in the middle, triangular-acuminate at tip, less so below, sessile. Flowers absent. Petioles about 1 cm. long.

Serjania Papilio n. sp. No. 27327, La Barranca, Guadalajara, Nov. 19 1930, growing on bushes like Clematis does. Stems variously angled but not evidently sulcate nor striate but white-woolly-pubescent in lines. Leaves pinnate, of 5 leaflets, the laterals almost sessile, the terminal one cuneate into a short petiolule. Leaflets ovate to oval, 1.5-2 inches long, biserrate rather deeply and irregularly, shortly and abruptly acuminate, rather thick, white-woolly below and nearly smooth above, strongly venose on both sides, the terminal one winged on the petiolule. Peduncles stout, the longest ones 3-5 inches long and with a very

stout coil at the end. Flowers white, rather many, on a short rachis and nearly sessile, 3 mm. long, open, the spatulate petals and filaments sparsely hairy throughout. Filaments recurved at tip. Anthers elliptical and puberulent. Fruit about an inch long by .5 wide, cordate, with each wing 12 mm. wide, straight veined and shining but minutely woolly, produced a little (1 mm. wide) around the tip of the cell. Cells flattened slightly, but nearly globose, 3 mm. wide, not inflated. This seems near S. vesicosa.

Ipomoea Acaponetensis. n. sp No. 23547, Acaponeta Navarit (Tepic) Mex. March 3 1927. A free and tall climber Leaves large, inclined to be tripartite and with broad sinus, softly and velvety pilose, 4 inches long, sinuate-toothed and very wide. Internodes long. Flowers many, in corymbs, on pedicels 1-2 inches long, about 1 inch long, with tube half the whole and then campanulate and with short lobes. Calyx lobes ending in filiform tips 1 cm. long. Pods globose-ovate, 1 cm. long. Seeds black.

Drymaria Fendleri var. **perennis n. var.** Stems 1-2 ft. long, perennial. Leaves reniform, triangular-acute, wavy on the margins and on petioles 2-3 mm. long. Flowers puberulent. Sepals 3 5 nerved, pungently acute. No. 27020, the laguna, Laguna mts., Sept. 23 1930,

Drymaria barrancæ n. sp. No 27051a, La Barranca, Guadalajara, Nov. 17 1930. Growing with D. Blasiana Jones Cont. 15 125. A weak and widely spreading annual with capillary stems Leaves reniform, pointless, inclined to be deltoid at base, on capillary petioles half to a third their length, sparsely long-hairy, as is the whole plant. Flowers single, in open cymes, on pedicels not over an inch long. Sepals oblong-ovate, pointless, narrowly hyaline-margined. Petals very narrow and about as long as sepals

Stellaria lagunensis n. sp. No. 27059, the laguna, Laguna mts., Sept 22 1930. Weakly erect from running filiform roots, widely branched from the base, 1-2 ft. long, the upper half floriferous in the axils on one side of the stems and on capillary and puberulent and ascending pedicels 1-2 inches long. Sepals about 4 mm. long, ovate-lanceolate, green, longer than the petals and shorter than the capsules. Seeds black, shining, lenticular, rather sharp-edged, obliquely reniform .5 mm. wide. Leaves linear, 1 inch long. Stipules absent or reduced to hairs.

Coldenia Loretensis n. sp. No. 27394 Mts. east of Loreto, Oct 17 1930. A prostrats shrub, white-hoary, in mats a foot in diameter. Stems zigzag. Pubescence specially dense on the petioles Leaves with blade about 3 mm. long, on stout petioles half as long, entire, rigid, deltoid-ovate, with revolute margins rather erose and with midrib impressed, acute, clustered at the end of twigs. Flowers white, about as long as the leaves, with calyx lobes barely visible. Bark of stems exfoliating.

Wahlenbergia filipes n. sp. No. 27322, Orendain Jalisco, Nov. 27 1930. Growing in waste places. Plants weak, creeping and rooting at the joints, probably perennial but very frail. Stems green, conspicuously ribbed and racemosely branched above and 6 inches high. Leaves cordate to cordate-ovate and acute, coarsely few-toothed, about 1 cm. long, smooth, sessile. Flowers single in the upper axils, on filiform peduncles an inch long. Calyx 5-cleft to the base and with the linear lobes 2 mm. long The ovate capsule about as long as the calyx and 2-valved to the base. Flowers deep blue with yellow throat.

Ruellia megacantha n. sp. No 27387, La Barranca, Guadalajaca, Nov. 25 1930.. Growing on steep slopes, a very slender and openly branched shrub, 4-6 ft. high, with leaves inclined to be clustered at the ends of twigs. Young leaves rather shaggy with dense flattened white hairs, but without glandularity, becoming almost smooth in age. Leaves 2-3 inches long by 1.5 wide thin, not closely feather-veined, elliptical-ovate, shortly acuminate at both ends, on petioles not over 1 cm. long. Flowers blue. 2-2.5 inches long, about 1.5 inches wide, puberulent, with rounded lobes ¾ inch long, widely spreading, tube 1-2 cm. long, then funnel-form and as long. Calyx lobes hardly 1 cm. long, narrow, about as long as the oblong-obovate and almost sessile fruit. Flowers about 3 in a leafy cluster at ends of twigs. Two calyx lobes filiform, the rest wider. This species close to R. Californica but without its pubescence, and flowers twice as large and leaves relatively more acuminate below. A showy plant.

Beloperone intermedia n. sp. No. 27436 Cayuca ranch, Sierra Giganta Oct. 23 1930. A shrub 3-4 ft. high, openly branched, slender and leafy. Stems minutely white-pubescent which condition extends to petioles and calyx, no glandulosity. Leaves about 1 inch long, entire, veiny, thin, smooth except for a little pubescence on lower veins, obtusely ovate to oval-ovate and abruptly cuneate into a short petiole. Flowers single in the upper axils, and single in the cluster of leaves. Bracts variable, mostly spatulate and rarely over 1 cm. long. Flowers red, 2 inches long, cleft down ⅓. Calyx 2-3 mm. long, its lobes oblong-ovate to lanceolate and ashy. Anther cells equal, not parallel but the lower white-spurred. Seeds rugose. Technically this should be a Siphonoglossa but it seems like a depauperate B. Californica, but whole habit different, seeds those of Purpusii, color of flowers much redder and corolla tube barely 2 mm. wide, no viscosity, inflorescence very different.

Plantago Patagonica. I cannot see any good reason for splitting this into several species as has been done.

My No. 23391 is Crusea parviflora H. & A. ,not villosa.

Houstonia peninsularis Brandg is an openly branched shrub with leaves mostly in fours. The flowers vary much in length from .5-1 inches long. Lobes of corolla about 4 mm. long and widely spreading, for 4 mm. more the corolla tube is enlarged a half below the lobes then rather abruptly contracted to the very slender tube.

Borreria lagunensis n. sp. No. 27124, the Laguna Laguna mts Sept. 22 1930. Tufted woody plants growing under liveoaks, about 2 ft. high, with many stems from the crown of the vertical root. Stems simple, with about 4 pairs of leaves, asperulous with very short white hairs apparently from a pustulate base. Leaves narrowly linear-lanceolate, acuminate at both ends, more so toward the tips, entire, with revolute margins, opposite, white below and green above, somewhat asperulous with scattered hairs but surface appearing as if covered with flat granules. Flowers in dense terminal rarely proliferous heads, dark-purple, 5 mm. long, with slender tube and ovate lobes about 1 mm. long and equaled by the oblong anthers, tube slightly longer than the triangular-subulate (and at length acerose) and hispid calyx lobe.

Spermacoce Jaliscensis n. sp. No 27118, Orendain Jalisco, Nov. 30 1930. Plants growing in tufts 1.5 ft. high, strictly erect, shrubby below, branching a little above the middle. Stems smooth. Leaves smooth, linear, revolute, strongly ribbed, fascicled, acuminate at both ends, nearly sessile, entire, 2 inches long by 3 mm. wide, with few or no setæ in the axils. The sheathing stipules truncate and with few setæ. Inflorescence corymbose and with few cymosely arranged heads. Peduncles 1-3 inches long, strict, angled, fistulous at tip and winged there, mostly with a cluster of leaves subtending the half-inch heads. Calyx lobes green, linear, rigid, acerose, smooth, tube hairy. Flowers minute. Common.

Bouchea flabelliformis n. sp. No. 27439, Triunfo Oct 6 1930. Erect and simple annual much like B. dissecta Wat. and with the same ashy pubescence. Stems channeled, 1-2 ft. high and ending in a bractless raceme 4-6 inches long. Leaves opposite, oval-ovate, cuneate into the filiform petiole which is ½ as long as the blade, the whole 2-4 inches long, dissected nearly half way to the midrib into 7-11 oblong and apiculate lobes about 1 cm. long, occasional lobes again cut. Flowers 1 cm. long. Calyx tube linear, clavate, the subulate teeth about 1 mm. long. Corolla exserted, nearly as long as calyx tube, rather labiate and 4 mm. wide at tip, blue. Frust twice as wide as in dissecta and so narrowly exserted.

Stemmadenia rugosa n. sp. No. 27317, La Barranca Guadalajara, Nov. 17 1930. A shrub 6-10 ft. high with slender branches, entirely smooth. Leaves oblong-lanceolate-acuminate, subcordate below, 3-6 inches long, on petioles nearly as long,

entire, 1-2 inches wide. Flowers in terminal cymes, white, about 3 cm. long and nearly as wide, with short tube barely longer than calyx. Calyx lobes about oval and rounded, 1 cm. long. Corolla lobes finely wrinkled when dry, connected by a thin membrane. Growing in rocky places.

Viburnum deltoideum n. sp. No. 27306. The Cape, Sept. 14 1930. A shrub about 6 ft. high, with slender and openly branched stems. Leaves ovate to deltoid, triangular-acute at both ends, low-crenate, smooth or ashy, on slender petioles half as long as the blades and not margined. Flowers 1 cm wide, white and with tube as long. Calyx lobes linear-subulate, 1 cm. long. Umbels mostly sessile. Fruit wanting.

Lobelia amabilis n. sp. Laguna mts. Sept. 22 1930. An erect and slender annual about 2ft. high, with short internodes and many thin leaves. Basal leaves much reduced, ovate, about 1 inch long, triangular-acute, cuneate into the slightly margined petiole which is nearly as long as the blade, laciniately and rather coarsely few-toothed. Middle leaves the largest, lanceolate-acuminate, about 3 inches long and with slender petiole $\frac{1}{3}$ to $\frac{1}{2}$ as long as the blade more deeply and irregularly cut-toothed. uppermost leaves almost linear. Whole plant up to the smooth inflorescence sparsely strigose-hairy. Plants inclined to be cymosely branched above, but inflorescence of 1-3 racemes 1-2 ft. long, the flowers brilliant-purple, about 1 cm. long, white-striped below and with the 3 lower petals broadly ovate and about 4 mm. long; the two upper ones linear and short. Calyx boat shaped and split nearly to base, about 5 mm. long, with all its lobes linear and 3 mm. long, the lower remote from the upper. Flowers slightly spurred. Pedicels 1 inch long and filiform, ascending. Fruit absent. A very graceful, delicate and pretty plant.

Lobelia Loretensis n. sp. No. 27279. Growing in wet places in tufts at Primiera Agua, Oct. 26 1930. Allied to L. splendens, 2-3 ft. high, erect and strict, very leafy with imbricated leaves linear-lanceolate, closely and finely spinulose-serrate, smooth, about 4 inches long by $\frac{1}{2}$ inch wide, veiny, almost sessile. Flowers at first yellowish with red stripes, then cardinal. 1.5 inches long, with narrow and nearly linear lobes about as long as tube. Calyx tube 2-3 mm. long, a little shorter than the triangular-subulate and green lobes. This differs from L. splendens in the serration of the leaves, short and linear corolla lobes and short calyx. There are forms approaching this from Texas with very long and linear calyx lobes, by Lindheimer.

Mercurialis glabra n. sp. La Barranca, Guadalajara, Nov. 17 1930. A weakly erect annual, 6 inches high, with leaves and branches nearly opposite. Leaves thin, elliptical, shortly acuminate at both ends, obscurely crenate, smooth but with short

hairs on nerves and margins, 1-2 inches long, almost sessile. Stems channeled and inclined to be pubescent in lines. Pods ovate, deeply 3-angled and 3-celled, 4 mm. long, splitting to base at maturity. Seeds 2-3 in each cell, black when ripe, a little flattened coarsely rugose at least around the margins, shining, 1.5 mm.' wide. This is outside the generic limits but cannot go elsewhere. Manifestly allied to M. annua L. but cells apiculate when open, and not blunt and hairy as in annua, and the seeds have the few pits very wide and not pavement-like as in annua.

Cuphea. Since printing page 50 I incline to take up Parsonsia on page 64 and so my C. Watsoni becomes **Parsonsia Watsoni**

Vernonia camporum n. sp. No. 27696. On prairies, at Orendain, Jalisco, Nov. 27 1930, growing with Cacalia, etc. Strict and tufted herbs, 2-3 ft. high, with simple stems, drying black. Heads small, 4-6 mm. long and 4 mm. wide. The pappus slightly tawny, 2-3 mm. long, bracts with black tips, narrowly oblong, a little floccose and the outer ones acerose-tipped. Akenes tapering from the truncate tip, and about 9-ribbed. Leaves nearly sessile, lanceolate, leathery, 3 inches long by 1-2 cm. wide more evenly low-serrate, roughened on the margins and punctate, ascending, many.

Vernonia viarum n. sp. No. 288 of 1892 from Chiquilistlan Jalisco May 30. Erroneously identified by B. L. Robinson as V. Deppeana. A shrub with rather compact and cone-like panicles of many heads on short and divaricate pedicels. Whole plant rough ad grayish with minute pubescence. Leaves elliptical-lanceolate, and shortly acuminate, about 3 inches long by 1 wide, nearly sessile on a stout petiole and rounded to truncate below. Heads nearly globose, about ¼ inch long, greenish, the bracts flat, oval, acutish, somewhat lacerate on the margins, about 4-ranked and successively shorter and a little shorter than the white pappus

Vernonia floccosa n. sp. No. 27700. La Barranca, Guadalajara. Nov. 23 1930. Plants tall, erect rigid, with striate-angled stems, 4-6 ft. high, corymbosely branched above. Stems smooth below, the upper floccose. Upperside of leaves and the heads densely white-woolly. Leaves lanceolate, leathery, venose, corrugated, about sessile, 2-3 inches long, sharply low-serrate. Ocasionally sessile, in small clusters at the end of the long common peduncle (4-6 inches long), which is leafy bracted at tip. Heads hemispherical, 1 cm long, with closely appressed, oval-ovate, apiculate bracts buried in wool, the longest about as long as the pappus which is composed of many flat and filiform parts enlarging above and with a secondary series of similar and acute ones 2-3 mm. long. Akenes densely setose-pubescent and very short. The plants closely resemble V. Leopoldiana. Growing on prairies.

Eclipta pusilla n. sp. No. 27739, Arroyo Undo, Oct. 25 1930, in waste places. Plants low, 3-5 inches high, erect, corymbosely branched and with heads cymosely arranged on peduncles erect and not over 2 inches long. Leaves elliptical-lanceolate and obtusish, entire, 1 inch long, on short petioles, ashy and minutely punctate as if glutinous. Involucre a single piece but 5-toothed and with hyaline edges lacerate, also ashy with tangled hairs. Heads globose-ovate, 7 mm. wide and with golden-yellow rays nearly as long. Ray akenes somewhat flattened and very flat-warty especially on the back, truncate and without pappus. Disk flowers large and embraced by the hyaline andhooded bracts which are as long as the flowers which are long-hairy on the midrib and hooded and lacerate at tip. Disk akenes not developed but ray akenes dominating the heads. An insignificant herb.

Stevia serrata Cav., my No 28654 from the Chiricahua mts. Ariz has no pappus bristles and S. micrantha has two long ones.

Stevia bisecta n. sp. No. 27800. Orendain, Jalisco, Nov. 27 1930. Plants slender, erect, strict, sparingly branched racemosely above, but with final clusters cymose. Whole plant ashy-woolly except the bases of scales. Stem 1-2 mm. thick. Primary leaves very deeply 3-5-toothed and lanceolate, subtending fascicles of linear and revolute ones an inch long. Petioles very short and margined. Heads about 6 mm. long and 4mm. wide and green. Scales linear, 3-nerved, acute, hairy above, in about 4 series. Akenes strongly angled, linear, black, 2-3 mm. long, half as long as the rather tawny and slightly plumose and very fine 5 pappus scales which are capillary above their $\frac{1}{2}$ mm. long triangular base. Flowers purple and very short.

Mikania anomala n. sp. No. 27806, Guadalajara. Nov. 26 1930. Growing along ditches, tufted, erect, strict, with leaves opposite, nearly linear, 2-3 inches long by 4 mm. wide, acutish, entire, rather thick. The whole upper plant forms a narrow and compound panicle of innumerable, very small and erect heads, each on a filiform pedicel 1-3 mm. long. Upper stem and peduncles woolly-hairy in narrow lines on the inner face. Heads 4 mm. long by 2 mm. wide, smooth, with 2-4 linear, convex and hyaline, loose, equal, and a little lacerate bracts. Flowers 2-3 in the heads. Corolla lobes exserted, oblong-linear and longer than the very short, wide and woolly tube. Akenes 2-4, sharply angled, smooth, cuneate-linear and with minute crown and no pappus and half as long as bracts. This quite unique plant has the corolla of Mikania but absence of climbing habit and of pappus.

Eupatorium megaphyllum n. sp. No. 27848, La Barranca, Guadalajara Nov. 17 1930. A tall and coarse plant with square stems, 4-6 ft. high and leaves a foot or more long, lanceolate, sharply acute, with very low-apiculate teeth, abruptly con-

contracted into winged petioles an inch wide, slightly if at all connate, smooth. Flowers in short, axillary and dense panicles. Heads about 1 cm. long, with the narrowly-oblong bracts in about 3 series, and obtuse, striate nerved and hyaline. Flowers white. Heads in compact clusters. This appears near E. compactum, but heads larger and with more flowers. Leaves 1-nerved.

Brickellia Undonis n. sp. No. 27822, Arroyo Undo, Oct. 26 1930. Allied to B. peninsularis but heads congested on pedicels 1 cm long. Bracts linear and barely acute, not acuminate as in that species but leaves about the same though barely half as long and with minute pustulate pubescence. Stems white and not green, in pubescence.

Brickellia megaphylla n. sp. No. 27814, Arroyo Undo, Oct. 23 & 26 1930. A shrub, 4-6 ft. high and allied to B. grandiflora. Leaves triangular-acuminate, 3 inches long by 2 wide, from nearly entire to laciniately toothed, a little cordate, palmately nerved by 3 strong nerves at base, the central one being pinnately nerved above, and the two laterals 3-5-nerved on the outer half much as in Eupatorium collinum. Pubescence short and flat but evident. Serration of leaves tending to be hastate. Plants velvety-pubescent. Petioles 1-2 inches long. Flowers in an an ample corymb, on short (2-6 mm. long) pedicels and erect. Bracts about 4-ribbed and 1 cm. long, acute, green. Akenes 10-ribbed, densely pubescent and black akenes not nealy smooth, It differs from Brickellia grandiflora in the akenes and in the shrubby habit, much larger leaves and pubescence. The stigmas are sometimes elongated as in Eupatorium, see No. 27813.

Robinson in his revision creates a section Stevioideae for his pulcherrima which I think should be called Stevia pulcherrima.

He also keeps up Gray's B. squamulosa which is a pistillate Baccharis squamulosa.

Brickellia cayucensis n. sp. No. 27818. Cayuca ranch, Oct. 23 1930. Near B. Coulteri. Climbing high and widely branched divaricately and with slender branches. Leaves cordate-ovate, to almost deltoid, 1-1.5 inches long, papillately roughened and unequally crenate-serrate, acute, on petioles 1 cm. long. Stems white-barked. Heads few, at the ends of the branches and 1 cm.long, about 10 flowered. Scales smooth, linear and strongly ribbed. Flowers white. Pappus white. Akenes densely hairy.

Brickellia diffusa n. sp. No. 27821. Guadalajara, Nov. 24 1930. Tall and openly branched, 2-3 ft. high. Leaves cordate-ovate, 2 inches long, on very stout petioles 1 cm. long. thick and leathery, shortlyacuminate regularly serrate, covered beneath with densely white areas of wool between the meshes as if stellate-pubescent. Stems 1-2 ft. long, divaricateiy branched into an open panicle half as long. Outer akenes triquetrous and slightly winged. Awns somewhat shorter.

Xanthisma Texanum DC. I think this genus is more intimately related to Grindelia than to Aplopappus, and it has the habit of that genus.

Amblyolepis setigera DC. There is little doubt that this genus is too near the Hoopesia group of Helenium, but whether this is congeneric with the genus is a problem.

Lagascea decipiens. This puzzling species and genus departs from ideal Compositæ structure in the heads, and one is reminded of Mexianthus and one species of Eupatorium by the individual flowers being rotate-spreading in the head. The problem is exaggerated by the bracts which cover the disk and are gamophyllous and inclose the single flowers. The structure of the anther tube is the only sure index of its Composite origin. Were it not for L. biflora having two flowers in a bract the problem of relationship would be hard.

Melampodium minutiflorum n. sp. No. 27738, La Barranca, Guadalajara, Nov. 17 1930. Weak and widely spreading annuals with filiform stems intricately branched. With innumerable oblong heads 3-4 mm. long and with very minute white rays scarcely visible. Leaves opposite, oblong, inclined to be lanceolate, 5 mm. to an inch long, soft and thin, on filiform petioles 2-3 mm. long. Involucral scales 2-4, concave, oval, thin, several-nerved, glutinous. Ray flowers 2-4, with very broad rays for their length, reflexed. Akenes 1-2 mm. long, conspicuously cup shaped and warty all over the back, not produced at the rounded summit, flat on the inner face and 1-nerved. They are not evidently a continuation of the scale and akene, Inner flowers 2-4, some with hyaline bracts; others without bracts and with linear and abortive ovaries. All flowers deciduous. Plants 1-2 ft. long. Hairs flat and tapering. Pedicels 2-10 mm. long. This grows with the next.

Melampodium anomalum n. sp. No. 27727, La Barranca, Guadalajara Nov. 17 1930. This has the habit of the last and similar leaves but nearly sessile, and with the pubescence minutely ashy and not glutinous, and plants nearly smooth. Inflorescence much more open, and pedicels 1-2 inches long and 2-bracted. Heads smooth and shining, with 2-3 short, oval, and unequal outer bracts passing into the oval, concave, hyaline, smooth, and nerved scales 4 mm. long, which are about four, then come 2-4 fertile flowers without rays, most of them acuminate into recurved (not hooded crowns with the 2-nerved part forked a little at tip. Akenes flat or a little convex and oblong, 3-4 mm. long exclusive of the beak which is variable from almost nothing to 3 mm. long. Back of akene yellow-warty in 3 lines, the central akene on the thinner side mostly flat and 1-nerved and minutely pubescent. Inner flowers with 1-3 hyaline, oblong, persistent, and empty scales, and 1-3 naked flowers with linear and abortive ovaries. Receptacular scales

persistent. This plant is manifestly Melampodioid but there is no cup-shaped area at tip of akene as in M. longicorne.

Coreopsis diffusa n. sp. No. 27720, La Barranca, Guadalajara, Nov. 17 1930. A weakly branched and diffuse annual, 3-4 inches long, with short internodes, and ovate, bipinnate leaves an inch or two long and thin, with primary segments cuneate below, and final segments triangular and cuspidate and very short. Heads on filiform peduncles 1-2 inches long and scattered among the leaves, appearing radiate, at least with two series of akenes. Outer bracts few and short; the inner elliptical and 4-6 mm. long, then gradually passing into the few central ones which are linear. Outer row of akenes round, light-colored, smooth, oblong, rounded at both ends, and without pappus or markings. Inner akenes single or few, black, flattened and with inner face concave, smooth and with narrow white wing lacerate, with no pappus, oblong, 2 mm. long like the rest. This seems near Blake's C. aggregata but inner bracts narrower.

Perezia kuhnioides n. sp. No. 27693, La Barranca. Guadalajara, Nov. 25 1930. Tall, strict and smooth and tufted herb, 3-4 ft. high. Leaves cared, oblong-lanceolate, 2-4 inches long, low-toothed, and rather remotely so, leathery and rigid. Corymbosely branched above and very slender. Heads many, in capitate clusters of half a dozen heads which are 4 mm. long to the end of scales. Scales about linear, pruinose and acute. Akenes linear, narrowed above into a distinct neck and with enlarged disk-like tips, 10-ribbed. Pappus nearly white, 4-6 mm. long, copious, a little scabrous above, very fine. Flowers about 10 to a head

Perezia nitens n. sp. No. 27798, Guadalajara Nov. 26 1930. On prairies, 3-4 ft. high, strict, rather racemosely branching, pruinosely pubescent throughout and heads or young parts deciduously floccose early. Leaves oblong-ovate, shortly acuminate, finely and regularly acerose-serrate, veiny, many, appressed, a litte reduced above where subtending the inch-long heads. Heads one to few in the axils and with a larger cluster at the tip, all in a linear spike a foot or more long. Scales narrowly linear, all acuminate and the outer ones long-acuminate and all aculeate at tip. Heads about 20-flowered, rather wide. Inner scales about 1 cm. long and twice as long as the linear and barely beaked and densely pubescent akenes with stiff and ascending hairs. Stamen tube white and elongated. Corolla tube puberulent. Upper side of leaves shining. This belongs in the Wrightii group.

Notes on Perezia.

Perezia Wrightii **var. Arizonica (Gray)**, P. Arizonica Gr. It is evident that these two reputed species are not distinct.

P. Wrightii scales are ovate to oblong, rounded but often apiculate and lacerate, the outer inclined to spread, thick, not striate. Akenes scabrous, angled, beaked, with broad and disk-like crown. Pappus nearly white.

Perezia megacephala has the oblong scales acute below but not the inner ones, imbricated. Akenes smooth, deeply 8-ribbed and with no warts between, 1 cm long, slightly contracted at the ends with no disk at tip.

Perezia Arizonica and Wrightii have lacerate and ovate to oblong scales slightly ribbed and scabrous akenes with wide disk and white pappus.

Perezia oxylepis has lanceolate to linear-acuminate, not lacerate scales and beaked, scabrous, slightly ribbed akenes with a broad disk and traces of a crown.

Perezia hebeclada has scabrous, slightly lacerate scales lanceolate to linear-acuminate and acerose. Akenes slightly beaked, ribbed and scabrous.

Perezia foliosa has lanceolate, long-acuminate and rather acerose scales, smooth and not lacerate. Akenes slightly ribbed, scabrous, beaked, with a broad disk.

Perezia Lozani has oblong, very blunt and spreading thick lacerate scales puberulent. Akenes narrowed at both ends, with prominent disk, scabrous, barely ribbed and with tawny pappus

Perezia microcephala has linear, apiculate, scabrous scales, the roughness almost hairy. Akenes about half the usual length and 4-angled, scabrous, truncate and with rather large disk. pappus white as usual.

Perezia nana has puberulent, striate, ovate to acuminate-lanceolate, lacerate scales. Pappus inclined to be tawny, and akenes very-shortly pubescent and slightly ribbed, short-beaked and with broad disk as if a crown.

Perezia runcinata has linear-acuminate lacerate scales, scabrous, long-beaked akenes about 5-angled and evidently related to nana. Root tuberous.

Perezia Thurberi has ovate to lanceolate, scabrous,, not lacerate scales. Akenes very short, truncate not beaked, scabrous angled. Pappus white.

Perezia turbinata reverses the usual order by having the outer scales the narrower, all striate, acuminate, nearly smooth, not lacerate- Akenes long-beaked, angled, scabrous, with broad disk- Pappus rather tawny.

Perezia nervata n. sp. Orendain Jalisco, Nov. 26 1930. On prairies. Plants 2-3 ft. high, erect and strict, pyramidally branched above, nearly smooth throughout. Leaves thick, narrowly oblong-lanceolate and obscurely toothed, acute, tapering into a short and margined petiole. Heads about 1 cm. long, dark-colored, with rigid and closely appressed, ovate to oblong bracts. Flowers about 10 in a head. Pappus dirty-white, 3-4 mm. longer than the scales. Akenes cuneate-linear, 2-3 mm. long, round, very strongly 7-nerved and with shining low warts between the ribs, truncate.

Verbesina ampla n. sp. No. 27780, La Barranca, Nov. 17 1930. Tall plants, shrubby below, with ample corymbose inflorescence, of many heads 1 cm. long and yellow rays. Leaves about 1 ft. long, opposite rather triangular in outline, with very strong veins raised and pinnate, 3-5-lobed and the lower pair of lobes the largest and triangular-acuminate, and coarsely few-toothed, upper surface papillose-scabrous with rudimentary hairs, and lower surface velvety with short hairs. Leaves cuneate into the winged petiole which is 1-2 inches long. Wings of stems 1 mm. high, thick and rounded, continuous to inflorescence. Heads very many on pedicels hardly 1 inch long. bracts in 3-4 series, linear to oblong, acutish, puberulent, lacerate, yellowish. The receptacular scales very narrow, and hyaline, with greenish, puberulent, not acerose tips, those of ray yellow and ovate, about 1 cm. long, the akene cuneate, 3-4 mm. long, somewhat flattened, smooth, with a very broad and papery ear on each side. Disk akenes linear, much flattened, narrowly winged below, slightly wider above. Awns strong and fully as long as or longer than the akenes and subulate. Proper tube of corolla short and hairy. Stamen tube black and white-striped and ending in ovate ears. Also No. 27699

Viguieria triangularis n. sp. No. 27710, Arroyo Undo Oct. 26 1930. A shrub, 2-3 ft. high, with simple stems, and branching and cymose inflorescence. Slender stems ashy, angled but not winged. Leaves opposite, 3-nerved, on slender and hoary petioles not winged and half an inch long. Leaves shining on both sides, but roughened by minute and rudimentary hairs on the nerves, acuminate, low-crenate-serrate, very rugose, about 3 inches long, almost truncate at base, reduced above. Heads few and on almost filiform pedicels 2-3 inches long. Involucral bracts narrowly linear and lax, 1 cm. long, about in one series, much longer than the disk bracts which are linear, strongly nerved, acute and rather pilose on the margins. Rays elliptical, 1 inch long and yellow, seemingly neutral, and with lacerate scales at tip of akenes and no awns. disk flowers brown. The akenes with two stout scales or awns as long as the akene, and lacerate and on the angles and with a few shorter linear and lacerate scales between. Corolla tube pubescent. scales ashy. Manifestly related to V. cordifolia.

Viguieria longiligula n. sp. No. 27708 La Barranca, Nov. 15 1930. A somewhat shrubby based herb, 3-5 ft. high, paniculately branched above subcorymbosely. Leaves opposite, 4-6 inches long, 3-nerved, silky-velvety below and nearly smooth above but covered with pustules, shortly acuminate, cuneate into a petiole slightly winged above. Petiole about an inch long. Upper leaves much reduced and inclined to be lanceolate. Heads rather cymose, on filiform pedicels not over 4 inches long, few,

with golden-yellow elliptical rays about 1 inch long. Involucral bracts linear, spreading but not lax, 1 cm. long, somewhat irregular, longer than the ribbed disk ones which are rather setose at tip and closely inclosing the akenes. Akenes of ray appearing neutral, either without pappus or with short scales. Ray akenes flat, long-shaggy on the margins and pubescent on the face, with 2 subulate awns or scales with lacerate margins and some shorter inner scales also lacerate. Corolla tube pubescent.

Viguieria magnicapitata n. sp. No. 27701, La Barranca Nov. 25 1930. Plants with the habit of Rudbeckia laciniata, erect and tall, 3-4 ft. high and simple. Leaves very thick and leathery and low-rugose, very scabrous on both sides and with pustulate-based hairs short and rigid. Leaves narrowly elliptical, acuminate at both ends, alternate, almost sessile, strongly 3-nerved entire, 4-6 inches long by 1-2 wide, many Heads nearly sessile and single in the upper axils, 1-2 inches wide, very rigid. Outer involucral scales ovate-lanceolate-acuminate, rather lax and canescent with rigid white hairs, 1 inch long or less. Disk scales rigid and linear, almost pungent, inclined to be scabrous. Disk akenes linear, triquetrous, puberulent, truncate, capped on the angles by subulate, scaly and triquetrous awns as long as the akenes which are scale-like at base and toothed, and by single intermediate scales that are oblong and rectangular, truncate and erose and rarely 1 mm. long, and white. Plants too old to determine the ligules. A very remarkable plant. Pappus persistent. Growing on the prairie.

Verbesina Cayucensis n. sp. No. 27718, Cayuca ranch, Oct. 23 1930. In open places, a slender and erect annual with the habit of V. encelioides. Whole plant ashy-pubescent with curved short hairs even to the ciliate-margined and thin and nerved bracts. Leaves ovate-lanceolate to lanceolate, 3-4 inches long, flat and thin, acuminate,, inclined to be laciniate toothed below and 3-nerved, on stout and margined petioles about 3 mm. long. Stems branching cymosely into few elongated parts with one to few heads which are erect on pedicels 1-3 inches long. Proper bracts barely 1 cm. long, oval-oblong, rounded and flat, about eight-green; then comes an inner series with as many or more hyaline ones a little longer and some of them subtending the few linear yellow rays which are not over 1 cm. long or very short. Ray akenes elliptical, flat, hardly smooth, without pappus but with a tuft of hairs at junction of the pilose corolla and akene. Disk akenes very flat and thin-winged, ending in lacerate edges, and with face upwardly pilose and tipped with a distinct crown from which 2 stout, subulate and persistent awns arise as long as the oblanceolate akene. There are no scales to the pappus but corolla-tube constricted below and very pilose there. The awns of V. encelioides are evanescent and hair-like when present, and the and akenes with corky wings. and narrow bracts.

Verbesina crocata I do not recall the author of this name for this unique plant, a botanical monstrosity that seems to be trying to be a climbing shrub and dont know how. La Barranca, Guadalajara Nov. 19 1930. No. 27704. A spraggly widely spreading shrub, 6-8 ft. nigh with the habit of our Californian Nemophila aurita but spreading out horizontally and not on the ground, but the Composite heads give it away. The branches are set at at right angles to the trunk and are winged. Leaves inclined to be horizontal 3-5-lobed and coarsely and irregularly sharp-toothed and acuminate, with broad and winged petioles 1-2 cm. long, and wings decurrent on stems. Leaves dark-green, rough-pubescent with very sharp and tapering hairs from a conspicuously pustulate base, and shining as if beaned. Peduncles stout, cymose and terminal, ashy, erect, with the single heads oblately globose, 1 inch wide and dark-yellow or black and rayless, but with fertile ray-flowers, and with many thinly-winged, smooth, black and flat akenes with 2 awns and no scales. Chaff of receptacle flattish and not embracing the akenes. Disk flowers yellow, and their akenes linear and wingless. Involucral scales many, unequal, linear, acute, rough, closely appressed. Flowers many in the heads.

Verbesina pustulata n. sp. No. 27711, The Laguna Laguna mts., Sept. 22 1930. A tall herb 3-4 ft. high, growing in clumps. Whole plant even to the bracts covered with yellow pustules which often end in very slender and crisp hairs, particularly on the under side of the leaves. Leaves ovate, acuminate, about 3 inches long, truncate below, winged on the petiole which is 6 mm. long and stout. Leaves velvety below, very veiny, very closely and sharply serrate with teeth 1 mm. long. Heads terminal in compound cymes on filiform peduncles. Bracts soft, narrowly oblong, green but whitened by pubescence, barely acute, thin. Akenes oblong-obovate, very thinly winged above and ending in a lacerate crown and with 1-2 stout awns 2 mm. long. Crown varying from none or to a ring or a real and terminal wing Akenes sparsely pubescent.

Sclerocarpus Triunfonis n. sp. No. 27717, Triunfo Oct. 6 1930. A weakly erect annual, branching above, with opposite, slender-petioled, thin, triangular-acuminate, coarsely serrate leaves, about 3 inches long, finely pubescent with appressed hairs. Heads few, cymose on slender petioles, yellow. Involucral scales about 6 ovate and stalked, green, spreading, ashy with fine and appressed pubescence. Disk scales spatulate and with whitish tips very pubescent and long-ciliate, short. Rays deltoid, yellow, ½ inch long, on a long and filiform stalk, pubescent without. Ray akenes obliquely obovate, about 3 mm. long warty and pilose, nearly roundish in cross section. Stamens separate, linear, black but yellow-tipped. The plant has the general appearance of Versina encelioides. Sclerocarpus spatulatus Rose Cont. Nat. Herb. Vol. 1 103 is so poorly described that it cannot be identified.

Franseria aceritolia n. sp. No. 27765, Cayuca ranch, Oct. 23 and Arroyo Undo, No. 27764, Oct 26 1930. A slender shrub erect and openly branched above but not rigid, 6-8 ft. high, paniculately branched above and with the slender branches ending in ovate panicles not over 1 ft. long, the involucres rotate and with 8-10 bracts shorter than the heads and strigose. Fertile flowers few, woolly, with about 10 light-yellow, slender and hooked spines. Stems, petioles, and midribs densely and very shortly rough-pubescent with whitish hairs, the lower sides of leaves with similar but less dense pubescence; the upper sides papillose with sharp warts. Leaves ovate in outline, not over 1 ft. long, on stout petioles rarely 1 inch long, alternate, pinnately 7-9-lobed to below the middle, with the lower 1-2 pairs of leaflets much reduced, all lobes triangular-acuminate and irregularly and sharply serrate, the terminal leaflet much the longest. Flowers yellow. Heads on capillary peduncles.

Sanvitalia longepedunculata n. sp. Nos. 27761 and 27729, La Barranca, Guadalajara Nov. 19 1930. An erect and widely branched annual. Leaves ovate, inclined to be acuminate at both ends, sparsely crenate-serrate, on short petioles, 2-3 inches long, thin. Inflorescence of few filiform peduncles 2-3 inches long and cymose. Heads ovate, with conical receptacle. Rays none. Disk flowers very many, whitish. Chaff on receptacle papery, embracing akenes and hyaline-margined. Akenes flat, thin, with surface smooth, narrowly winged on the margins and long-pilose there with ascending hairs, emarginate, with a low crown and single and capillary awn on the corners. A weed in fields.

Sanvitalia Aberti Gray, Dragoon pass, Ariz., Sept. 24 1931 has involucral bracts scarcely distinguishable from the chaff, but thin and hyaline-edged.

Zinnia barrancæ n. sp. No. 27698, La Barranca Guadalajara, Nov. 17 1930. Tall and erect, 3 ft. or more high, with the simple stems puberulent. Leaves pustulate-acerose on both sides, 3-5 inches long by 2-3 wide, oblong-lanceolate, shortly acuminate, rough-veined below, minutely crenulate. Flowers in terminal and cymose heads, the central head bracteate. Peduncles 4-6 inches long and stout. Heads 1 cm. long and wide, grayish with white pubescence in lines. Bracts ovate, 6-8 mm. long, acute, closely appressed, the inner series with greenish expanded and reflexed tips. Rays red-orange, 1 cm. long, spreading. Akenes flat, deeply notched, with tips acuminate into rigid awns upwardly ciliate, 4 mm. long, the awns about 2 mm. long. Ray akenes triquetrous and sharply winged and with shorter awns.

Palafoxia linearis **var gigantea. n var.** Sand dunes west of Yuma Sept 26 1931. Plants 5-6 ft high, erect, single. Leaves 4 inches long by ¾ inch wide, linear-lanceolate and acuminate, flat, shining on upper side. Heads 1.5 inches long, large, with pappus almost wholly exserted and ⅓ the whole, with the outer scales almost destitute of hyaline margins and all ending in needle tips. Stems striate. This has been referred to the species but is a well-marked variety, very robust but not shrubby.

P. leucophylla Gray seems to be the same as P. arenaria Bdg I see no use in kedping up Polypteris

Lagophylla scabrella (Jepson). Hemizonia truncata var scabrella Jepson. A slender, erect and glabrous annual, dichotomously branched above into an open and almost capillary panicle. Leaves linear, 2-3 inches long by 2-3 mm. wide, acute, entire, rigid, sessile, gradually reduced above and often with a single tack-shaped gland at tip. Whole plant perfectly smooth and with reddish branches. Heads solitary on capillary and bracted pedicels, oval, about ½ inch long, bright-green. Fertile akenes 3-5, embraced by the boat-shaped, green and smooth scale which has a long and cobwebby fringe of white hairs on the inner margin, the akenes being obovate, obcompressed and arcuate, rounded and epappose, black and smooth. Flower with 3 rigid, yellow rays, 3-6 mm. long. Disk flowers white or pinkish, epappose, the ray flowers seem imbricated. Plants 2-3 ft. high. Pitt river bridge, Cal.

Galinsoga Ruiz and Pav. Whether there is more than the one species here I do not know. The ray flowers are white and very short; the pappus is of several oblong scales variously lacerate and pointed. My species, sphærocephala exaristate, is epappose, but otherwise as in G. parviflora and has linear or very narrow leaves

Cosmos sulphureus Cav., No. 27752, La Barranca, Guadalajara Nov. 16 1930. Erect plants, branching above and ending in single large and pedunculate heads, on peduncles often a foot long Plants almost smooth. Leaves lanceolate to ovate, bipinnately to narrowly oblong segments which are acute and acerose Petioles beset with long, tapering, flat hairs, with midribs having scattered and spreading and short ones. Heads in flower 1 inch long and in fruit 2 inches long, with conspicuous orange rays 1 inch long. Flowers about 15. Akenes about 25 mm. long, linear-fusiform, tapering below the middle into a filiform beak nearly 1 mm long which is scabrous, the body of akene roughened with the sub-pustulate bases of nascent hairs, the rudimentary hairs of beak are ascending, but hairs of the 2 short and subulate awns are downwardly barbed at tips. This species is close to Bidens Berlovii and bipinnata, both having rudimentary beaks. The heads have several bracts among the akenes. Pappus [illegible]

Bebbia filifolia n. sp. No. 27783, Cayuca ranch, Oct. 23 1930. A tall shrub, not spinose, with filiform leaves, 3-5-parted and 3-4 inches long. Involucral leaves oval, lacerate, 2-5 mm. long, only the innermost linear and acutish. Heads short-pedunculed. Branches many, as in Bigelovia, and shrubby below.

Elephantopus spicatus is the correct name for my No 23346 of my 1928 collection.

Cacalia coriacea n. sp., Orendain, Nov. 28 1930. On prairies. Plants coarse, 3-4 ft. high and erect from a thick root. Leaves rosulate, very thick, leathery, venose, smooth, laciniately cut into 6-7 broad, cut, and sharply toothed lobes, and with petiole winged above. Leaves a foot or more long and wide, with rounded sinus or cordate, the lower pair of lobes with 4-6 parallel nerves, inclined to be erect on petioles as long as the blades and which are a little chestnut-woolly below at the slightly enlarged base. Stem leaves 3-5, somewhat clasping with sheaths 2-3 inches long, abruptly tipped by a sharply and spinulosely cleft and linear end 1-2 inches long which passes into similar spinulosely serrate outer bracts. Proper bracts about 1 cm. long, equal, convex, broadly elliptical, inclined to be lighter colored, faintly many-nerved, smooth, a little lacerate on the margins and with tips dissected into a tuft of hairs about as long as the white pappus, in 2 rows. Heads fully ½ inch wide and high, very many flowered. Lobes of corolla very long, linear. Pappus almost plumose. It recalls the compass plant, Silphium laciniatum.

Zexmenia microcephala Humb. 27788 Orendain.

Zexmenia Seemani Gray is my No. 23412 of my 1928 collection

Zexmenia pustulata n. sp. Northwestern Mexico 1930. Erect herbs 3-4 ft. high, few-branched above. Leaves opposite, ovate-lanceolate, nearly sessile, 2-4 inches long, entire, or very obscurely serrate, rugose below and apparently densely pustulate above and minutely pubescent beneath. Stems low-winged on the angles, oppositely and shortly branched above. Heads few, in irregular cymes; the central ones nearly sessile; the lateral ones variously long-rayed on stout peduncles 1-2 inches long. Heads yellow, ½ inch wide, nearly spherical, with the yellow linear rays about as long. Bracts successively shorter outward but not in ranks, with tips reflexed, thick, green, rounded, very rough gradually passing into hyaline, obovate, slightly lacerate, yellowish, thin inner bracts which in turn pass into the conduplicate, variously lacerate scales subtending the black akenes which are obovate-lanceolate, smooth, slightly nerved, very thinly winged at least above, the wings terminating on the angles of the rather truncate akenes in a raised area and then jointed to a subulate awn as long as the akene at each angle, but with no accessory pappus. The center of the end of the akene is produced into a false neck to which the corolla is jointed in a bulbous enlargement which contracts abruptly to a real neck 1 mm. long and then expands into the usual Helianthus flower. Corolla puberulent. Stamen tube not black. Ray akenes not as winged as disk ones. General appearance like Silphium perfoliatum.

Dysodia fimbriata n. sp. No. 27784 La Barranca, Guadalajara Nov. 19 1930. This would come under Rydberg's proposed genus Clomenocoma Cass. Erect and tufted from a perennial root, conspicuously corymbosely branched above, striately angled. Leaves sessile, green, 1-2 inches long, fimbriately pinnate almost to midrib with nearly linear segments rather broader above and very deeply cut and ending in long and flexible setæ or hairs. Stems branching at tips into several filiform peduncles 3-5 inches long, and bracted and ending in single heads. Involucres 1 cm. long, obconic, of nearly distinct and dotted scales (leaves not glandular-dotted) and several accessory outer and green bracts dissected into long setæ. Rays fertile, saffron-yellow, 1 cm. long, oval. Akenes linear, finely 15-ribbed, about smooth, truncate at tip, with about 5 inner pappus scales dissected nearly to base into 5 or more unequal setæ, and with 5 spatulate outer scales ½ mm. long Pappus much as in D. Cooperi but the truncate scales absent in Cooperi. General aspect of plant that of Aplopappus spinulosus.

Porophyllum rotundifolium n. sp., No. 27777a, Orendain, Nov. 27 1930. Whole plant green, rather shrubby below 3-4 ft. high, erect, branching from the upper axils, with the slender branches divided and about 6 inches long and ending in subumbellate clusters of 3-10 heads on filiform and minutely bracted pedicels 1-2 cm. long. Heads rather cuneate, 1-1.5 cm long, the 5-6 scales about 1 cm. long and each with 2-3 narrowly oblong and large glands. Akenes about 6 mm. long, linear but some tapered above, pubescent, faintly yellow-ribbed. Pappus plumose, nearly as long as akene, Leaves oval, 2 inches long, venose, palmately veined below, smooth, upper ones reduced and inclined to obovate and about 1 cm. long. Inflorescence conspicuously leafy On prairies.

Porophyllum purpureum n. sp. No. 27777, La Barranca Guadalajara, Nov. 21 1930. An erect shrub about 5 ft. high, corymbosely branched above, smooth throughout except the upwardly pilose akenes. Leaves coriaceous, elliptical, obtusish entire, 1-2 inches long by 1.5 wide, on stout petioles a fifth as long as blades, somewhat reduced above, but never to bracts. Heads few at the ends of filiform final branches, in cymes. Peduncles 1 inch long, filiform and with knots at the ends, the heads early deciduous. Heads 12-14 mm. long and 2 mm. wide, few-flowered. Akenes black, finely striate, very shortly hairy, obscurely contracted at very tip. Pappus a little over half as long as akene, sordid, scabrous. Rarely the lower leaves become 1 inch wide. There several allied species but none very near. This has the general character of the above but pappus only scabrous, leaves quite different, and flowers of that are greenish; the bracts of the two have similar oil-glands

Porophyllum nodosum n. sp. No. 22684 Nov. 15 1926, La Paz. Leaves simple, filiform, nodose, 1-2 inches long. Heads widely panicled, on filiform peduncles. Plants 2-3 ft. high. Flowers less than 10 to a head. Pappus a little tawny. Akenes scabrous, with beak 1 mm. long. Scales linear, 1-5 mm. long, the inner with hyaline margins.

Encelia anomala n. sp., No. 27716, Arroyo Unlo Oct. 25 1930. Annual, erect, 2-3 ft, high, widely branched throughout, with leaves opposite and stems slender. Leaves very rough with stiff, short and appressed hairs, inclined to be triangular-hastate to broadly ovate, with few coarse and ascending sharp teeth, acuminate, with base cuneate into a slender and low-winged petiole ½-1 inch long. Hairs with pustulate base, acuminate, with upper side of leves less pubescent. Stems elongated. Peduncles and involucral baracts conspicuously striate. Bracts flat, rounded and oblong-oval, 6-8 mm. long, appressed, almost in 2 rows, shaggy-hairy above, about 12. Receptacle conical. Chaff very thin and hyaline, truncate, 3-nerved, smooth and shining, twice as long as akene, and with tips inclined to be purple or green. Corolla tube broadly linear, with lobes triangular and greenish, and stamen tube black. Akenes broadly linear, squarish when mature and with strong midrib, 3-4 mm. long, 1 mm. wide, a little wider above, high-warty all over when mature, smooth. Peduncles 4-6 inches long, single. Rays persistent, rather rigid, golden-yellow, emarginate, broad, ½--¾ inch long, about 10, fertile. This has the habit of Verbesina encelioides but more bracts and no wings on akenes. It grows around corralls.

Bidens Orendainæ n. sp. No. 27770, Orendain, Nov. 27 1930, on bottoms in fields. Leaves regularly 3-5-pinnatifid into narrowly lanceolate, long-acuminate divisions, with appressed, regular and very sharp teeth evenly spaced. Heads about ½ cm. wide. Outer bracts almost filiform. Akenes linear-acuminate, but scarcely beaked, 1 cm. long, hispid and sharply warty above, the ray ones appearing wider, tips with a few flattish scales or hairs and no warts. This seems to verge toward Cosmos. Several species of Bidens show a tendency to diverse akenes with warty sides or backs leaning toward Heterospermum.

Bidens barrancae n. sp. No. 27757, La Barranca Guadalajara, Nov. 23 1930. A weak and much branched annual, 1-2 ft. high, with almost bipinnate leaves with the lanceolate and incised segments acuminate, 2-3 inches long, very thin, opposite, on a petiole 1 cm. long. Upper leaves simple, 3-lobed, linear-elliptical, 1-2 inches long. Heads few, cymose, on filiform pedicels 2-3 inches long. Heads 5 mm. wide, oblately spherical. Outer bracts linear, ciliate. Rays about 1 cm. long, white, and yellow veined, cuneate-obovate, several notched. Akenes linear, not 1 cm. long, 4-angled, smooth. Awns 1 to 2 mm. long, yellow, Plant with the habit of Coreopsis parthenioides but near B. bipinnata, a conspicuous field weed.

Stephanomeria Mexiae n. sp. No. 2506a, Baruschi north of Minaco Chihuahua Mex., in dry washes. Flowers purple Plants 1 to 2 ft. high, erect from an erect and tnberous root, inclined to be woody below, with several simple stems fromthe root. Leaves rosulate below, linear-oblanceolate, gash-toothed, floccose-woolly with deciduous wool. Stem leaves linear, not over 1 inch long, entire, reduced above to very small bracts. Plants racemosely branched above, with few large heads on slender peduncles. Bracts at base of heads linear; involucral ones 6 to 10 mm. long, smooth, hyaline on the margins. Stamen tube elongated, hyaline. Styles black or dark red. Pappus plumose to base, not chaffy below. Akenes linear, truncate, smooth. Styles linear and quite broad and yellow.

Tithonia tubæformis Cass. No. 27705, La Barranca Guadalajara, Nov. 23 1930. Plants annual and with the habit of Helianthus annuus and possessing the cultivated fields in the same way, 4-6 ft. high, racemosely branched and ending in single, large and long-peduncled heads. Leaves ovate to triangular-ovate, acuminate, coarse, 3-nerved, on stout petioles about 1 cm. long, somewhat margined. Leaves crenulate, ashy with short white hairs from a pustulate base, darker above, with the young parts silvery-silky with fine white hairs 5 mm. long. Heads 1-1.5 mm. wide, and wider than high with convex receptacle. Proper bracts in a single series, or with an intermediate series of narrower ones within which are not acerose as are the disk ones, all bracts strongly many-ribbed, oblong, 1 cm. long, acutish, appressed except at very tips, ashy-hairy as are the leaves, but pubescence longer. Chaff on receptacle linear, convex, nearly smooth, acuminate into a very stout and spinose beak 2 mm. longer than the flowers. Rays 1-2 inches long, light-yellow, about 1 cm. wide, veined, from abortive, flat, and slightly winged ovaries, and without pappus, and smooth except for some cobwebby hairs. Disk akenes black, smooth, angled truncate, linear, about as long as corollas, crowned by a row of minute and lacerate scales, and often with 4 awns from winged bases, but very deciduous.

Bidens pedata Brandg. No. 27779. On trail down the Laguna on cliffs. Sept. 24 1930. A tufted and erect shrub 2 ft. high, with innumerable filiform, dissected and smooth leaves 2-3 inches long. Stems produced into long and peduncle-like and simple floral peduncles about a foot long, ending in 1-2 rudimentary leaves and a few cymosely arranged heads on filiform pedicels 1-2 inches long Heads $\frac{1}{2}$ inch wide, with few short orange rays. Akenes with 2 coarsely and retrorsely barbed awns and no crown. Not at all fleshy. It belongs in the Seemani group.

Aspilia grosseserrata n. sp. No. 27778, La Barranca Guadalajara, Nov. 17 1930. Near A. xylopoda Greenman. Coarse and ereet from a rather woody root, racemosely branched above into slender and similarly branched laterals ending in filiform peduncles with narrow bracts, Leaves ovate-lanceolate-acuminate, 3-5 inches long, 3-nerved above the base, very rough with minute and raised papillæ which on the nerves end in long and very slender white hairs. Stems and petioles white-hairy. Leaves incisely and remotely serrate, and the teeth below sometimes becoming almost lobes; the lower part of leaves narrowed into a very wide and rather eared and sessile base. Upper leaves reduced to nearly linear bracts. Involucral scales in a single series, but the outer row irregular in length and all likethe leaves in pubescence, then gradually passing into the bracts of the receptacle which are hyaline except for a green midrib; these bracts closely embrace the akenes which are flat and apparently wingless and upwardly puberulent but rather hairy on the margins and linear and truncate at tip, and on the angles have single and subulate awns flaring at base and then turning up and nearly as long as the corollas of the disk flowers. Ray flowers sterile and the abortive akenes smooth and without pappus. Rays nearly 1 inch long aad obovate and purple, with the corollas abruptly contracted 2 mm. above the base. Crolla lobes sparsely pubescent with long white hairs. This does not seem to be any of the known species, but they are very diverse.

Bidens anthemoides (DC.) Sherff. The Laguna Sept. 22 1930. Nos. 27778 and 27767. Growing in sandy places, a weak and widely branched annual, erect, 1-2 ft. high, nearly smooth, with conspicuous yellow flowers. Leaves about 2 inches long, opposite, petioled, palmately compound and with the secondary divisions pinnately dissected. Flowers cymosely arranged on long peduncles, 3-6 inches long. Heads about 1 cm. long and wide, with double involucre. Outer bracts linear, green and thin and nearly as long as the inner, tapering but obtusish, in one series: the inner bracts twice as wide and about 1 mm. wide, linear, purple rather convex, narrowly white-margined, narrowed toward tip and rounded there and with woolly margins. These pass into narrower bracts subtending the akenes. Rays entire, dark-striped, elliptical, 1 cm. long, 3 mm. wide, fertile, their akenes almost linear but larger above and rounded at tip and smooth, awnless, several-nerved on the inside and 1-nerved on the outside, lenticular in cross-section, black, about 3 mm. long. The next series (disk) akenes has a row of narrowly linear akenes sometimes fertile that are covered with spiny warts, no wings, and with 3 stout and subulate persistent awns nearly as long as akenes. The inner rows of akenes are mostly sterile but narrowly 5-winged and smooth. This has the appearance of a Bidens but the ray akenes make it a Heterospermum.

Sanvitalia Aberti Gray. No. 23612 Dragoon pass Ariz., Sept 1931. Involucral bracts scarcely distinguishable from the chaff on receptacle, but thin and hyaline-edged, green-tipped and green-striate, as long as chaff. Chaff very rigid, sharp, linear, convex, greenish-white, 6-8 mm. long, erect, with sunken green grooves as if ribs, subtending the disk akenes but not the ray ones. Rays ovate, rigid, leathery, convex in cross-section, 3-4mm. long, yellow inside and light-colored on the outside, and with many green ribs, grown to the thick and obpyramidal akene which is triquetrous and 4 mm. long and $\frac{1}{2}$ as wide at tip and truncate and 7-10-striate with green and sunken ribs, with 2 horns on the outside of the awns, the raised area included inclined to be corrugated. Disk akenes oblong but a little wider above, somewhat flattened and 7-grooved, black, warty on the ribs and with no pappus. Disk flowers small and greenish. It has the habit of a low Heliomeris. Robust specimens from Rustler's Park have rays 1 inch long, the leaves lanceolate and strongly toothed, obtuse, Zinnia-like.

Hutchinsonia hyalina n. gen et sp. Plants belong to the Polypteris section of Compositæ and apparently allied to Hymenopappus. Erect perennials, somewhat woody below, corymbosely branched above and with clusters of 6-8 heads in loose corymbs the heads on filiform peduncles with linear and smooth bracts. Leaves many, pinnately dissected into linear segments, 1-2 inches long, minutely hairy, gradually reduced above to linear bracts. Heads white, rayless, without chaff, with 10-20 flowers. $\frac{1}{2}$ inch high. Bracts oblong, rounded, hyaline, lacerate at tip, free, in 1 series, ashy, not embracing the black akenes which are truncate at tip and 5-angled or -ribbed, puberulent, linear. Corolla tube broadly oblong, contracted below a bulbous enlargement and then reduced to a tube, its lobes triangular and erect. Pappus of 5 linear, hyaline, pubescent scales with 1-3 strong ribs ending in plumose awns.

Named for Mrs Susan W Hutchinson who was with me in Arizona in 1931 and who collected this at Peach Springs in 1932

Field Notes of Mexican Trip, 1930.

I went to San Jose del Cabo, 14 miles east of Cape St. Lucas and reached there Sept. 14., landing in the surf since there is no wharf, from the steamer Jeannette. Vegetation very dry, and only lowland stuff any good. Rambled out to river and got some stuff. On the 15th. went to the beach, 3 miles by the road, and got more material. Bambos vulgaris is common in low places. There is one big clump of B. aculeata. Saw one tall tree of Attalia Cohun near beach, cult. probably, a fine tree with smooth white bark. Dates are all yellow now. Grapes are full size but green. Bananas green. Pomegranates ripening. Washingtonia Sonoræ fruits more common than with us and ripe or nearly so on plaza. Did not notice any Erythea. Cocoanuts frequent. Sugar cane not yet ready to cut though edible. Got a Potamogeton like Zannichellia in habit in the freshwater pond at the beach, also a brittle Chara. There is a plant with habit of Veronica (Seymeria) creeping and rooting in the mud, but in the water is erect when submerged. Jouvea pilosa, the type of Vasey's new genus, is dioecious, and with very pungent leaves that stock will not eat, is in mounds at the storm line and helps make sand dunes, The flame Tree that I got at Los Mochis in 1926 is here with fiery-red flowers in big clusters. There is a petaiya (C. Thurberi Eng.) here but no cardon (Pringlei) in sight so far. The white fig is cultivated and so are grapes and guavas. There is a beautiful shrub here that ends in a vine, Apocynaceous, with large blue-purple flowers. Cultivated fields are lousy with Euphorbias. There is a fleshy-rooted Abronia on the sand dunes of the shore, maritima, with purple flowers and is prostrate. There is a Calliandra-like large tree, Albizzia ? cultivated for shade. There is a large fig tree like Palmeri with shiny elliptical leaves and buttressed trunk and snake-like roots, Palmeri has aerial roots like the banyan. It is 50 ft. high and looks as if it might grow on rocks like Palmeri. There are many trees of Populus Fremonti common along the bottoms along with Salix Bonplandiana and Baccharis viminea. Both species of Philibertia cover bushes to 20 ft. high. The flowers of Cereus gummosus, the edible petaiya, are white, open in sunlight, 5 inches long, by 3-4 inches wide, purplish on the outside, with tube 4-5 inches long; fruit nearly globose and 1-3 inches wide, sparsely spinose with deciduous prickles and full of blood-red (venous) pulp and small black seeds, and very juicy. It blooms sporadically now. Cereus Pringlei, the cardon, is scarce on the hills but Thurberi is less common than the horrid gummosus. Echinocactus Falconeri is frequent and with spines flat, cross-ringed and normally hooked, with the lateral ones thread-like and many and no wool. There is a little Mamillaria here which grows in small clumps, apparently the same species that I saw all over.

Also there is the big-teated one (M. Poselgeri Hilldmann) that I found first in big clumps at La Paz, it has the spines of Echinocactus and was referred to Cochemiea by Rose and is M. Roseana Brandegee. There is a Cylindropuntia with the sheathed spines and the habit of prolifera, everywhere, with black rudimentary flowers that I have called O. abortiva, which proliferates the ovaries several times though there are mature seeds in them. There is another that simulates Cereus Emoryi but with smaller yellow joints. There is a Platopuntia with yellow joints also. There is an openly branched shrub. like Tetracoccus (Jatropha spathlata). There is a lizard, 1-2 ft. long, with long aud tapering tail which is blotched with gray all over and without the yellow neck-ring of our tiger lizard though equally swift. Saw a jackrabbit. Temperature at noon is 90 degrees plus, humidity 80 % Things dry slowly. I hear a California quail calling. Buzzards are common but I see few other birds. Got two snails like the n. sp. I got 2 years ago under rocks,but these on the shady side of bushes up in the air 2 ft., resting period.

Todos Santos. I stayed at Cabo 4 days, then came here by auto, 65 miles. Road fair but bumpy, unimproved from a wagon road, much up and down and sharp curves, There is more cardon as you go north, also C. Thurberi. Yucca valida Brandg. is more common and up to 10 ft. high, just coming into bloom. with panicle sessile, ovate, 1.5 ft. long though rarely 3 ft.; flowers white, pear-shaped in bud, rotate in bloom and with tips incurved and petals oblong-oval, obtuse; flowers drooping: panicles erect, very many-flowered. with each flowor about 1 inch long and same shape as in Treculiana but not over half as large, seemingly uniform. Leaves very pungent, sharp on the edges (minutely-serrate) and without threads mostly, thin. $\frac{1}{4}$ to one sixteenth inch thick, rather flabby, quite concave and erect, reflexed in age, narrowed above the insertion, taper-pointed, blue, with black-spiny tips. The mango is ovate and with oblique termination, smooth and shining, about 4 inches long, with yellow and very juicy pulp and not so stringy as usual. It hangs in small bunches from the ends of twigs. The avocado is gourd-shaped, and shining, not warty like ours, and hangs from a long peduncle, and when ripe is soft and easily eaten with a spoon, and not so utterly worthless as the hard and green ones we are accustomed to at home.

Todos Santos. My object here was to ascend the very difficult Laguna mts. from the western and easier side and collect the summit flora. To do this I had to have pack animals and a reliable guide and packer. Being a stranger, I went to a friend G. W. Pickett who was running a gold mine at Pescadero, a few miles away, to recommend a suitable outfit, giving him full authority to secure it. He sent Alvarado, his wood foreman, an old man of fifty years, a very capable person who did not know the trails

but was reliable. So the next day he came with 5 mules and said he would take me up for 10 pesos a day, I to pay for feed and grub which was very reasonable, $5 a day. I will leave the details of this terrible trip to a private letter written to a friend on the way back:

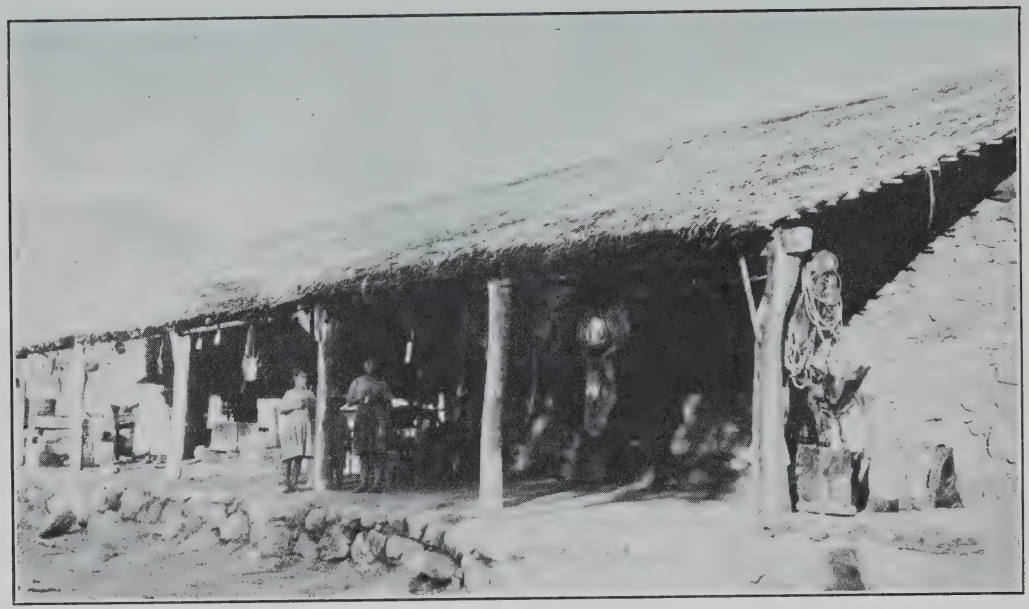
Pelota Ranch, at foot of
Laguna mts. L. Cal.
Sept. 24 1930

Dear Midge;

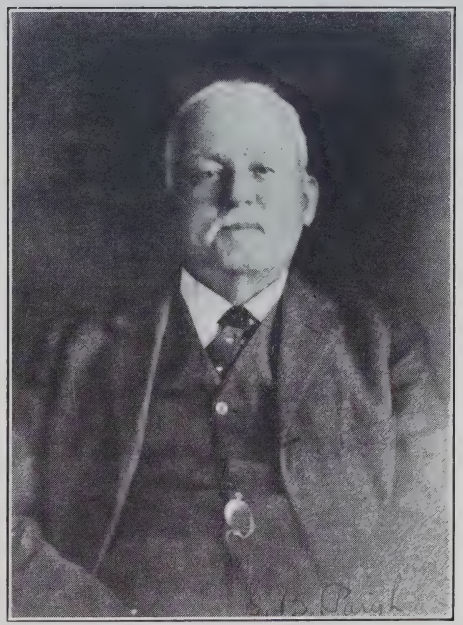
Well, I have seen the "enemy" and he is mine. I am now about 20 miles east of Todos Santos, just beyond the "Ultima Thule" of the Ancients, on my way back.

I reached the Cape Sept. 13th. Had to pay 30 pesos duty on my driers because the fool custom official could not find the proper classification for my cardboard driers, and so he soaked me six times their value the tax on writing paper, as duty. Then my host who kept the hotel where I was driven from the boat soaked me 5 pesos a day for room and meals. Then I hired an auto to take me to Todos Santos, 65 miles for 40 pesos. There I went to the same hotel where I stopped before and the two old maids who ran it remembered me and agreed to keep me for 2 pesos a day. It was three days till I got a Mexican to take me to the top of the Lagunas for 10 pesos a day, with 3 pack mules and saddle animals. Next a. m. we started and I had Purgatory riding but not so bad as I expected. We got 16 miles by noon to the Cota ranch and then 4 miles farther to the Borego ranch 4 miles below here. We slept out but they fed us, 4 meals, 2 pesos. Next day my moso got 2 young men from here to go along and show us the way and cut out the brush from the trail so that it would not strip the packs off the mules on the way. My ! But it was a terrific trip, right up all the time, often so steep the mules almost fell back making it, in fact one mule did fall over backards and rolled down endwise once and sidewise twice. When I saw his tail and legs flopping in the air I said to myself " The jig is up", but we all got hold of the mule and lifted him on his feet and he was unhurt but the moso would not repack him and put his pack on his saddle mule and footed it the rest of the way, abandoning the mule presumably to be eaten later on by the gatos gr andes (panthers). Had to get off and walk much. Got very hot and drank water like a fish. Had to stop often to cool off. By noon got up to 4000 ft. alt. and stopped under the first liveoak tree for lunch and to rest the animals. The men went down in the gulch after water at the only water on the trail. After an hour we saddled up and climbed the rest of the day till 5 p. m. when we got to the top, 7800 ft. alt. Then down again a mile or two to a little grassy meadow called Laguna Chica. I wanted to camp here, but the boys said to go on to the real Laguna which is a big laguna,

BOREGO RANCH



PRIMIERA RANCH, SIERRA GIGANTA



S. B. PARISH

PELOTA RANCH, LAGUNAS

2 miles long by ½ wide, and surrounded by the low rim of the crest. Here we camped under an old apple tree full of hard and ripe apples, tough but eatable, there was a ranch there once, but abandoned long ago to the gatos grandes which killed their stock.

The range from 4000 ft. up is covered by liveoaks and Pinus cembroides, The Laguna was not there but very fine water was running in a stream near by. Well ! Our animals were about all in, only able to stagger along like ourselves when we got there, but soon were greedily feeding on the rich grass, all but the poor white mule we abandoned so hastily. There were flowers everywhere (see photo of Outfit in Lagunas with masses of Sphacele in foreground.) Next day I began and worked very hard all day and getting a great stack of stuff. The men went hunting before dawn, with my automatic 22 rifle, but got nothing. It was so cold at night at the 6000 ft. alt. that we nearly froze. The boys left us at noon and charged me only 5 pesos for piloting us up, a very reasonable sum. My moso was deathly afraid of the big cats but I knew thøy are too cowardly to attack humans, had they been the leopardlike jaguars, not known on the peninsula. it might have been different. Each night was colder than the one before. After 2 days I had got the whole flora and told the moso we would return in the morning. So we were up early and off. I wanted to stop at Laguna Chica but when we reached it I saw I had all its flowers, and so we did not stop. Going up the faint trail through the weeds I lost it for I was afoot, botanizing along and fiddled around quite a time trying to find it, and yelled a lot and finally the moso heard me and came running back, frightened and so I knew where the trail was. After that he kept nearer me Then came the terrible descent from 7800 to 1700 ft. alt. It was a frightful thing to walk a little too fast on the hot ground, down eternally down the loose granite trail, the moso impatient to get down, mules walking almost on end, but no accident happened though cinches had to be tightened or loads readjusted. By and by my feet felt blistered and as if with pebbles in my shoes, and I poked along in agony, being too sore to ride. I had to lie down in the shade to cool off from the intense heat. I drank water like a fish and almost dripped sweat. By 1 p.m. we got to the tree where we lunched going up. It was the last of the liveoaks. Getting there I almost played out and would have done so if I had not saved my strength by resting often. I laid down under a tree not knowing we were so near water when the moso came back with water. Mine had been gone a long time. So I drank and went on down to the tree where I peeled off my coat and vest. My shirt was sopping wet, and I tried to cool off a bit and dry out. By and by he saddled up and I saw we had the old mule, and I spoke of it. He said he found him at the waterhole. So we con-

gratulated ourselves. Then more down over the worse trail, in the blistering heat before an oncoming storm, which did not reach us but looked threatening. Then I tried riding till my kidneys gave out because of the constant backward bending, then I had to get off and walk on my sore feet, but it was slow going but I made it. The moso was crazy to get down and kept yelling at me to hurry, but I could go only so fast which was very slow. finally after much agony I reached the beautiful waterhole on the river and stretched out on a rock to rest. There is no water in the river except where the bedrock forces the seeping water to the surface in waterholes. I wanted to rest half an hour but the moso wanted to hurry on. So in 20 minutes we mounted and hurried on a fast walk to here, arriving in an hour. Then I decid d to stay over night though they had only barbecued fresh beef to feed us. My! But I was tired. After a while I laid my bedding down in the dirt, and as soon as it was dark pulled off my pants and rolled them up for a pillow. Then the pigs, as it got cool, came in and crawled up my leg under the bedding to keep warm. Then the dogs would bark furiously and the pigs would scurry off to return later, snuggling up to a leg again. Then the two dogs growl at eachother over the best place at my side till they settled down.Then all would be quiet till one of them started the next stampede. At last I lost consciousness and did not wake up till dawn today. The rancher feared panthers were prowling around after a little colt he had. The sun has not yet got over the crest of the range. Well I am the first botanist ever to go up the Lagunas from the western side, and ought to be the last. It is Hell all the way up and Hell all the way down. No trail in California approaches it for pure cussedness, but I made it up there and got what I went for. I found a most unique grass dont even know the genus (Paspalum tenuissimum Jones), also a Carex of the filifolia group, (C. longissima Jones). Then I got a Populus, should be tremuloides but is not, may be monticola. I got a strange Œnothera, a shrub with 20 stamens (Helianthemum glomeratum). Well! It would take too long to recount them all but I combed the hills and vales for everything from lichens and fungi to Compositæ, and will get home today. Will take me a day to get my stuff all drying. Will soon be ready to start. Will take a photo of the place to show you (See cut). For pure squalor this is a peach, about like the old cave-dwellers. They charged me a peso for eats. Their guns are all pump guns with bore all rusted up. It is a wonder they will shoot at all.

Got off at 9.15 and reached here, Borego ranch, in an hour. We will stay here the rest of the day so that I can collect some shrubs and examine a pretty box canon here where they get water. We stopped here going up. It is intensely hot but endurable.

The whole country rock is granite, except here and there is some quartzite. The mts. are all steep and all covered by brush, 10-20 ft. high, most of the vegetation Leguminosæ, shrubs and small trees, plus Jatropha species, Bursera the copal trees, the cardon (Cereus Pringlei), and C. Thurberi, no true petaiya yet. The buzzards and a big white-rumped hawk(may be the condor) are common. Saw no squirrels nor chipmunks though gophers were many at the Laguna. There was a very tame humming bird feeding on the acres of Sphacele which cover the ground in great patches, as does Veratrum in Utah. The birds were very many. Never saw anything like them before. Bill black to middle from tip, then red to head. Top of head from bill to crest a dense black, also throat, with a white stripe enlarging downward for ½ inch from the eye. Then comes a lighter collar, then came the belly orange to the tail tip, the back a bronze-green somewhat white-speckled: tail a dull orangø; wings nearly black and longer than tail. It nested in the appletree.
Been out around and got a few things, but it is too dry here, very wilting-hot, will go down to the wash and call it a day. Feel very groggy. Will be glad to get home and have a little rest. This has been a very strenuous trip, even for a young man. My physical machinery is working all right and so I have no reason to think I am too old for this work as I suspected two years ago, but the "old machine" creaks a little in the joints and is a bit rusty. The moso up at the laguna made some tea for supper 3 times out of a Pectis or Tagetes that was good but too laxative. I took a $1.45 box of coffee extract from Claremont. Last night I told my moso to have the woman make us some coffee from it and so she took over half of it for 2 cups. It almost tanned my insides. One of the men just lassoed a rattlesnake and hung it up to strangle and it died in a few minutes. There are a few lizards up here, but little wild life. Got a brown Helix on a rock. 9 24 1930. Slept fairly well last night, but it was rather cold. Did not eat any supper due to my stomach being upset by the coffee. Will soon be on the last lap of the journey, and another half day of Hell. feeling fair for the trip of 20 miles.

The women do the milking, and they tie the legs and tails of the cows so that they cant kick or switch while being milked. My moso puts blinders on each mule when packihg him to prevent kicking. Even half savages are on to some tricks, but they dont know how to keep up machines nor tools. Had a good breakfast of fresh meat, coffee, tortillas, and milk.

Todos Santos. We were off at 8-30 a. m. Reached Cota ranch in 2 hours. Then down the intensely hot and gentle slope to the sea. Had to stop often to get off and walk (because of the agony of riding), or to drink from canteen. Once the moso ran ahead to stop the lead mule while I drank, but the mule bolted

into the brush and tore off part of his pack and loosened the rest so that it slipped and frightened the mule into kicking till it was all spilled off, then he bolted toward me, fearing a beating, so I caught him and spoke kindly to him and quieted him, then the moso came and led him back to be repacked, and without an oath nor raising his voice. He is a remarkable man of 50, does not smoke nor swear, wears leather sandles without stockings, has overall, shirt and sombrero, is married and with 9 children.
Well! We pegged along and at 2.30 got home. Everybody turned to greet us and were crazy to know about the gatos grandes and the trip, etc. So here ends the epic venture, the impossible!

Well! A dios'"

I have added parenthetical clauses to explain text.

Continuation of critical notes.

We left on the 20th. Humidity had been at saturation for 2 days. Reached the Cota ranch, 20 miles toward the mts. at 1500 ft. alt., in 4 hours. Humidity 55 %. Excessively hot and dry, was nearly finished by the heat though I had a helmit hat. Had to get off and walk 5 times on the way, and had to lie down in the sand 3 times to endure the heat, but got there at 1 p. m. Water was very short at the ranch at the waterhole. After an hour's rest we rode on to the Borego ranch at 1700 ft. alt., humidity 42 %. The ranch is a few hundred yards up a side canon near a water seep in a box canon. We camped here. At the seep is a sterile grapevine (Arizonica?), Adiantum, Notholæna, and much Selaginella lepidophylla. I got a few interesting things here. The ranch consists of 2 shelters which we may euphemously call houses, consisting of a roof held up on 4 posts and thatched by a cover of Erythea palm leaves, and walled by a wattle of willows. Their beds are made of poles laid parallel on crosspieces set in crotches driven in the ground. Their tables were higher but similar. Their cooking outfit was like the table but lower and with a cover of dirt on which to make a fire. The floor was of dirt, on which chickens, pigs, dogs and goat kids played or fought. In front of and joining the house was the corral where they kept 10 calves which they released morning and night to suckle the cows as they came in from the hills. The women did the milking. They gave us supper and breakfast of tortillas, milk, and meat.

No palms are growing here. There were a few liveoaks at the Cota ranch and on the way here but none here, not those of the mountain. The mt. sides are covered with palo blanco Lysiloma candida and the like shrubs and trees. Also there was much Tecoma stans. It was not so hot in the p. m. The brush is a little taller here and thicker. Saw one cardon with fasciation (cancer) on the top. I saw a very few fruits of C. Thurberi which are like the petaiya (C. gummosus) but smaller and rarely 2 inches

wide. The flowers are like those of C. Pringlei but narrower and a little shorter, apparently very dark. Morning. Humidity 80% Barometer unchanged. There is a leguminous shrub or small tree here with a spray-like flat top and there are some big and dark-green trees with wide pods 6 inches long (Albizzia). Tecoma stans is common and in flower and fruit. Most of the brush here has very light-colored and smooth bark blotched and darker-brownish below, very few with rough bark, even on big trees. The big cardon and Thurberi still occur but scarcer, probably also the petaiya. The big candelabrum shrub with large white flowers (Thevetia) came in at the Cota ranch and is still here. They have Cotswold sheep and Angora goats here, and 20 longhorn cows with small bags and 18 calves. The sheep are long-tailed. The pigs are red. The white-banded pigeon is here, also the gray-breasted jay with long tail, and blue all over except the breast. There are few birds.

Next morning, the 21st., we followed up the dry riverbed, 6 miles to the Pelota ranch, a near counterpart of the cliff-dwellers' homes. Here we engaged two young men to go along as guides and to cut out the brush on the trail. We stopped for the noon rest under the first liveoak, at 3800 ft. alt., the beginning of the Lower Temperate lifezone, and at the first water on the trail. They unsaddled and went down in the steep gulch for water. Humidity 38%. Ocean breeze. Here a few new herbs came in. The granite trail was steep and as difficult as I ever was on anywhere, being only a deer trail, but at 4.30 we reached the Laguna all tired out so that we could hardly crawl along, after passing the beautiful "Chica Laguna", a mile back. As we neared the top liveoaks covered the region and herbs became quite tall under them, 2-3 ft. high. The elevation of the crest was 7800 ft., but the highest point in the range, a few miles farther north, must have been 8500 ft. or more. The accepted elevation is 6500 ft. which is altogether too low according to my accurate Tycho barometer. As we dropped down off the crest the trail vanished, but we made another. The exertion of climbing the mountain about finished the mules as well as us, but the mules soon were greedily grazing the rich grass. I wanted to camp at "Chica Laguna" because of the condition of the outfit, but the men urged going on to the real Laguna and so we dragged along through the timber and came out to a beautiful grassy plain hemmed in by the mountain rim, and to an old apple tree under which we unsaddled and the men were soon up in the tree munching the ripe fruit. It was an ideal place to camp where one could see all over the plain from the gently rising ground, not 50 yards from a little stream. We were soon eating our supper, but I was too fagged to botanize that night however tempting might be the great masses of Sphacele, acres of them all around.

The name "Laguna" means a pond, and was given because there is a pond in the southern end of the grassy plain where stock can water, there is forage everywhere but water is scarce. The Laguna is really a grassy plain like the oldtimes " Plains" of eastern plains of Colorado, and with the grama grass, Bouteloua oligostachya, the most common, plus Cyperus aristatus, Aristida, Muhlenbergia species, all bunch grasses, growing on the poor granite and porous soil. The mesa is an undulating plain 3 by ½ mile dimension, with a little pond at the far southern end full of weeds and with border of plain fringed by a forest of liveoaks and Pinus cembroides continuing to the crest. My camp was 6000 ft. alt. and 1800 ft. lower than the crest. On our arrival we saw no stock but soon a burro came braying toward us, and later on we saw a band of horses and a few cattle. I turned in to bed early but the men sat around the fire till late visiting. The night was very cold to us accustomed to the Tropics and so the men were up before dawn getting warm at the fire. Then they borrowed my 22 automatic rifle to go deer hunting. Soon my moso came running back after more cartridges, saying they had shot a deer in the hear t but he got away. I made no comment on the stupidity of trying to kill a deer by shooting at his heart with a 22 but gave the desired ammunition.. Mexicans are poor shots, and the bigger the mark the more they like it. I was shooting with one recently when he shot at a cap box at 50 feet and missed it, firing from a rest, then I hit the bullseye offhand with a snapshot. If he had shot at the deer's head he might have got results.. As soon as I could get breakfast I was out among the flowers. There is much Erigeron Canadensis, some Lepidium medium, Verbena hastata, Gnaphalium Scouleri ? In the adjacent forest is a Madrona (Arizonica?). On the plain is Carex filifolia?, Cosmos, Cyperus aristatus, the Tuna. Among the trees is a Nolina 10 ft. high, glaucous-green with leaves 3 ft. long, ½ inch wide, tapering but pointless. There are a few young, small Erythea Brandegei Pinus cembroides is common and with the pinon cone but leaves very different. It is taller and more symmetrical. Humidity 60% Sphacele hastata grows here in great patches and is alive with hummingbirds. I took a walk down to the southern end, nearly 3 miles, it is very beautiful and has some running water above the pond which seems to end against a granite cliff under which it seeps. Got a great mass of specimens. In one place I found a new grape growing high, with clusters of ripe blue grapes. Near by on some rocks was the wild potato, Solanum Fendleri. A party of men came in the afternoon with a band of horses, and my moso thought they were horse thieves.

The next day I completed botanizing, getting everything in bloom or fruit. Humidity 40 percent. Big cumulus clouds in the eastern sky soon brought a hard thunder storm with much rain and lightning. Very hot and dry before the storm. I found

a unique new grass(Paspalum tenuissimum Jones) which Brandegee missed, growing everywhere on the plain, with filiform stems from an inch-wide tuft of leaves. I got 2 orchids, one with peltate leaves single from a tuberous root, growing in damp and shady places. Ferns were common in the forest, such as Adiantum Capillus-Veneris, Pellæa, Phegopteris, Cystopteris, Asplenium Trichomanes, also a big Aspidium, Lobelia Cotensis, also Valeriana sorbifolia, seemingly annual because of the slender stems from corm-like roots. There is a peltate-leaved Hydrotyle?, common below, also 2 small lupines, Astragalus ervoides not yet in bloom but common and prostrate, 2 Desmodiums, a Mimosa, the Madrona, Salix Bonplandiana rare. Only a black oak(Q. devia) here. Pinus cembroides often is 4 ft. diameter here and 75 ft. high and not as opnely branched as the monophylla pinon. There are several cups cut in the trunks, indicating that people got turpentine or rosin from them once. There are evidences of long-time occupation but all old. Humidity 65%. Populus monticola is here along the creek, a true aspen, with white bark and is strict, 75 ft. high, horizontally branched and with rounded top, twigs tough, not brittle, leaves falling as if it were Fall, and wholly unlike any other Populus. Arracacia Brandegei here has the habit of Myrrhis and is commun in the timber, as is Osmorhiza at home and is 1-6 ft. high with a big tuberous root, erect: leaves often flat on the ground. Brunella is common on the creek.

Sept. 24th., 7-30 a.m. Wet and cold last night, everything wet. Mules look better: Moso packing up. Dogs barked some in the night: moso said it was because of the big cats, but nothing happened, and stock all right. Got off at 8-30 and reached our previous noon stop at 1 p. m., beastly hot, I walked all the way and had to stop often to rest in the shade of the liveoaks, clouding up at 2 p.m. and hot and still. Got a lot of things coming down, nearly played out, soon will be down to the river waterhole. Clothes sopping wet with sweat. Got to Pelota ranch by 5 p. m., dead tired, small of back feels broken and feet blistered. I walked so much that the balls of my feet felt as if there were pebbles under them though no sign of blisters showed. 2100 ft. alt. Cool breeze. The ranch house forms one side of a corral It consists of 2 shelters roofed with Erythea leaves though no trees of it now in sight, and walled in by poles 6 ft. by an inch dimension. Between the two shelters it is roofed but open on the sides. In the center is a table on 4 posts made of small parallel poles forming the top, such as I once made in the Wasatch, then a layer of dirt formed a hearth for an open fire on which they cooked. The man just took a piece out of a side of beef and barbecued it for us on the coals. It looks pretty well smoked up. Their cow just gave a pint of milk, the calf taking the rest. There are 3 little pigs, 4 dogs, 5 turkeys, a dozen chickens of all sizes, under

foot. This is the primitive life of the old cave dwellers. There are 4 children , one idiot, 2 girls, 1 boy. The mother, about 30 and soon to have another. The dogs look half-starved. All animals are very tame. They have Cashmere goats and a young black-tail fawn, about a foot high. It is a cattle ranch on the edge of the brush. The man has several deer hides hanging up and one tanned buckskin. Morning. The folks talked late last night and the dogs barked much, apparently at panthers. The little pigs crawled to bed with me, insinuating close to my leg for warmth. I watched the stars march across the sky. Barometer reads 1750 now, evidentlly too high last night. People very pleasant but dirty and unshod.

10-30 a. m. Got to Borego ranch and will stay all day. They are cutting up a beef. Mules' backs are sore, mine least of all, from the down trip yesterday. Baby swinging in a panoche crate cradle and swung by a rawhide rope. 9 dogs here. The only weapon the men carry is a machete a kind of butcher knife, with which they cut brush and skin game. Everything is dirty. Two pigs, a few goats, a small band of sheep are here and some cattle. The Pelota spring is about ¼ mile up a side canon and seeps out from a vertical cliff and flows about 1 miner's inch. The one here forms a little waterhole and is rapidly drying up. Coming down there was a marked change in the flora at 4000 ft. where the oaks and Nolina stopped and and Bursera and Jatropha came in along with the cactus. My new grass and Carex stopped at 5000. Epicampes grandis also stopped. Humidity at that ranch at 7 p.m. 42% and this a.m. 75%. Season remarkably dry. It is hopelessly hot. One of the men just brought in a rattler and hung it up to strangle and without any show of feeling, just as my moso abandoned the old white mule on the way up. This seems cruel to me. Sept. 25 Morning. Humidity now 78 percent. at 7 a.m. People very kind, slow cooks. There are 2 fully grown girls here, 3 married women and 2 children . Goats, kids, lambs, calves, chickens snd turkeys all together under foot. The ground floor, dirt, is swept clean by splint broom.

Sept. 26, morning. Had a good breakfast of tortillas, meat, and coffee. Got off at 9 a.m. and went to Cota ranch and on to Todos Santos by 2-30 p.m. It was pretty hard on me to get off and walk from saddle soreness and thirst, and walked half the way but the result of the trip was just tiredness, nothing more. Moso figured I owed him 80 pesos, which I paid and was glad to get off at that. I consider myself fortunate in getting so good a moso as Alvarado, no doubt he would have refused to go had he known the difficulties. He is a man of fifty, gray, quiet spoken, all business, never swears nor smokes, rare qualities in a Mexican, is a crack packer and knows all about cinching up stock to keep packs on, is absolutely honest though he cannot read, wears sandals, overalls, hat and shirt.

CEREUS PRINGLEI VARIETY CALVUS

OUTFIT IN LAGUNAS

The fact that he took along no bedding showed caveman habits but he is a pretty fair sample of native man. When he came to settling up he was square and fair about it, making no attempt to gyp me, as most Mexicans would do. So one does not have to be civilized to be decent and honorable. He was accustomed to walking all day in sandals, never seeming to tire, and seldom had to drink water. On the contrary, I, an oldtime farmer boy, used to horseback riding, but 35 years out of practice was so soft that long riding was most excruciating agony to which I could not adjust myself, and so suffered intensely. So, when I got back to Todos Santos, I was about all in and very glad to slip off my mule, even if I had to tumble off. The women got busy at once with supper for us and everybody was glad that we had escaped the gatos grandes and back safe if not sound. It did feel good to come out of the blistering heat of the riverbed and below the Cota ranch and feel the cool ocean breeze. When we got to town the barometer read only 450 ft., which is 150 ft. too high, and which is a remarkable performance for such changes in elevation as we made on the trip. At 400 ft. Quercus Brandegei came in, a large and widely spreading tree, a black? oak, with narrowly oblong to lanceolate and mostly entire mature leaves, but young shoots with leaves inclined to be spinulose tipped and toothed. Below and to the Cota fence is an Anona bush, 10-15 ft. high, rigidly and openly branched and with tufts of leaves on the ends. Sphacele does not go below 5000 ft. The liveoaks are 5 to 1 as to Pinus cembroides. The spotted leaved Desmodium is common on rocky slopes down to 4000 ft. Thalictrum peninsulare is 4-5 ft. high, erect and only at Laguna along the creek.

Sept. 27. Went out to the beach, 2-3 miles and loafed along on the rocks listening to the beautiful and high waves as they broke on the shore. Also got quite a load of stuff, but did not see any Œnothera littoralis, nor Drymaria, so common in 1928. There is a cæspitose Cereus like Engelmanni, but smaller, with red flowers and red and shiny fruit, several hundred joints in a loose clump 3-6 ft. wide, common by the sea on rocks. The pitaya is somewhat creeping here. C. Thurberi also is low. Guavas, mangos, and avocados are ripening now. We saw the cerhuela plum ripening on our way down the Lagunas.

Sept 28. Left for La Paz on a truck so early (4 a. m.) that it was cold, and got there at 9 a.m. Feels good to be at the old Palacio hotel. The folks remembered me and glad to see me. I called on Carlos Leon, my friend, special federal agent, who was glad to see me. Will do odds and ends today. It is getting hot. Weather clear. Barometer 100 ft., normal elevation. No mail yet. Will have to stay a week for steamer for Loreto. Can get fruit here, such as avocados, mangos, oranges, lemons, and cocoanuts. Vegetation is greener here due to higher humidity. There

are 18 pearl fishing boats idle in the harbor now due they say to the beds being fished out. Saw an antelope chipmunk in several places north of the Cape and also the pure blue bluejay.

Sept. 29. Did not botanize yesterday but spent the day trying to hire a boat to go to Espiritu island. Will walk out to the brush to photo the viejo cactus, Cereus Schottii. Boatman is to come for the island trip tomorrow. No storm on tap for bar. is normal. Humidity at 9 a.m. 99%. Walked out ½ mile to beyond the tannery to photo cactus. Feet gave out not because of heat. The viejo cactus is a case of fasciation or cancer, and often occurs with the flowers, where the internodes are shortened and spines elongated to 2-4 inches, which gives it a whiskered look, and so the name of old man. The fruit is small, smooth, red and edible and the seeds black and smooth. Other species, as Pringlei are often viejo. The petaiya is larger here, often with stems a foot thick, but branches 2-4 inches thick. Flowers like the night-blooming-cereus. Cereus Thurberi has flowers about as in giganteus (apparently) and a globular fruit about an inch long and spiny, as in gummosus and red when ripe. The abortive Opuntia is taller here, often 8 ft. high and corymbosely branched above, fruit proliferous, light-colored and nearly free from spines. Cereus Pringlei here is very large and thick. Saw the little Grahami Mamillaria today. The petaiya flowers and fruit are common here now. The fruit of C. Schottii is red, ½-1 inch long, smooth. I learned today that they call the last east and west ridge of the Lagunas the "Victoria" mts., whose highest point is San Lazaro. 4 p.m. have secured a boat for 8 a. m. to go to Espiritu island, and hope for good botanizing tomorrow. Humidity 80%.

Sept. 30. Off at 8 a. m. in a 20 ft. boat. Sea smooth, fleecy clouds. Once in a while a big 3-cornered flat fish like a flounder would dart out of the water and turn half over and come down flat with a startling bang on the sea. It seemed to be having great fun at it. The boatman called it a manta, apparently the tinterero dreaded by the old pearl divers. Recently Capt. Anderson harpooned one 13 ft. across. Reached the island in 3 ½ hours by the old Ford-driven motor. On shore saw a black jackrabbit near the waterhole. More vegetation there. More cardon, petaiya more abortive Opuntia, also the yellow-spined cylindropuntia. No C. Thurberi. Saw a little Cucurb., may be the wild muskmelon Found the usual prostrate Euphorbias and a new one a shrub with habit of Eriogonum Thomasii with innumerable drooping stems inextricably interlaced, near shore on storm line. Simmondsia Prosopis and Cercidium are common here as on the mainland. All vegetation dried up. Got Cevallia at the waterhole. The southern end of the island is eruptive. volcanic ash, and isolated flows mixed and tilted 10° plus to the west. The north end seems to be sedimentary, sloping northwestward. Many shells on beach.

Very sandy beach. Gentle breeze from n. e. Got the Eucnide shrub at the waterhole. Was back at La Paz at 6 p. m., and took in Pechilinga island on the way, getting Fouquieria Burragei there A lovely but disappointing trip.

Oct. 1. It is sweltering hot and threatens rain, cumulus clouds in sky. Humidity at 11 oc. 78%. Bar. normal. They say it is raining at the Cape, very cloudy with little wind. Weather at 6 p. m. excessively hot and raining at the south of us. The soaring birds all down, but some swallows flitting about, the cloud barely moving. Bar. going down.

Oct 2. It looked very much like rain last night and still does. Pigs here are the red kind. Took a trip 20 miles south to the Cacachilla mts., but did not get beyond the foothills at 2000 ft. alt. and still in the Tropical life zone. Got a wild guava and some other shrubs. Was disappointed in not getting farther but driver feared the road for the sand was bad. All is granite blocks rounded and not angular on the hills, with a little schist here and there, no water, looks very much like a storm with strong wind from the east, very heavy and black clouds from the south and s. w. but no rain yet. No mail boat in, due to threatening storm, 5 p. m. a fine and misty rain is falling: cooled off a great deal; everywhere are black clouds and sea somewhat rough, but not bad yet.

Oct. 3. Went east 5 miles along beach to get Coulterella and saw many bushes all dried up and dead, only one alive. Very hot and dry. Got all tired out and thirsty. Barometer still out, but it looks as if storm is over. Steamer still in port. Got a pretty Prosopis (?) about 3 ft. high, much branched and spread out wide and full of fruit. Got Spirostachys in full flower, common on flat at slaughterhouse, with some bushes on tideland flat, but did not see the new Agave of 1928.

Oct. 5. Arranged to go to Triunfo 53 miles south, on the Cape route, with Capt. Anderson of Long Beach who is going there by private conveyance to try to evade a $120 fine for trying to smuggle in gasoline as fuel oil, hoping, if caught, to bride the officials. He is drinking heavily, but I can take care of myself even if I never drink. He is to return for me next day.

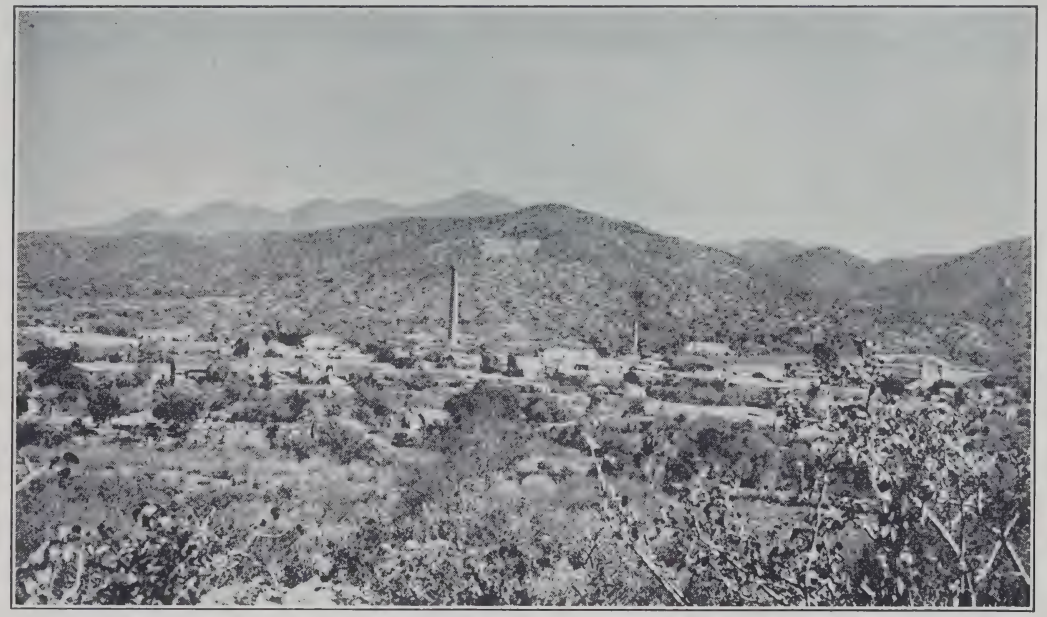
Oct. 6. Reached Triunfo duly, alt 1500 ft. Veg very dry and same as at La Paz. water in places along creek near town. Road washed considerably by last rain. Quite hot here, but not so bad as at La Paz. Hotel has cement walls and roof thatched with Washingtonia leaves set 6 inches apart each way, with petioles stripped of teeth and cut a foot long and tied to horizontal canes laid on rafters 3 ft. apart made of 2 by 4 scantlings. It makes a pretty roof. Leaves at least 3-deep and set petiole up. On the hills, in granite crevices is Notholæna Lemmoni, no other

ferns. The hills are mostly of granite rounded masses, with some obscure quartzites, and some white quartz veins. The old French silver smelter, probably a relic of Maximilian days and which made La Paz a big city is now shut down and dismantled since my last visit, but a bank of reverberatories and 8 sets of 5 stamps each of the mill and a huge tailings dump are left and a roaster, all now rusting up in the weather. Triunfo, a city of many thousands once, is now a typical scene of desolation. The substantially well-built adobe and cement homes are abandoned and roofs falling in. The thriving stores are closed and only an excuse for one left, run by a Chinaman. They have a girls' school of 25 pupils here, dont see where they all come from. The cemetery also has gone to decay, Louise Nesbett's tomb, a Mormon's ? is best preserved. Never saw a worse case of desolation, except Rhyolite Nevada. Parkinsonia aculeata is cult. here, also dates and Washingtonia, but not Erythea. Some C. Thurberi, one bush of an elongated C. Emoryi, one flat Opuntia and some aborriva, much shrubbery of Tecomc stans, Cracca, Prosopis, etc. Jatropha with smooth leaves, the horrid J. urens, Antigonum Leptopus, a little annual Verbena, Aplopappus diffusus 8 ft. tall.

Oct. 7. Went up the steep gulch below town. The C. Pringlei here is mostly whiskered (viejo) at tip. Vegetation more vigorous, but whole country sheeped out as if over-grazed, the nearer one is to water the less is the herbiage. The petaiya and Thurberi are less common; the little Mamillaria is common on the hillsides and so are Prosopis and Antigonum. Foggy in a.m., was cold last night. I met Coda here from Todos Santos and had a fine visit with him. He says the people are very hard up and starving and the stock dying from the drought.

Oct. 8. Waited all day for Anderson to show up and then went to bed. Was waked up at 1 a. m. by Anderson forcing his way into my room and insisting that I join them in going to La Paz, saying that they lost their way and went to Todos Santos and came across country for me, so to avoid explanations about this mythical road I joined them. They had a bottle of tequila along which I refused because I never drink, but Anderson was woozy by the time we got here. Will dry out today and put in press Weather cooler and clear, but bar. reads 180 ft. which is 100 ft. off. Humidity 70%

Oct. 9. Barometer normal. Clear and going to be hot. Mangos ripe and dates and bananas also, grapes passed, sweet potatoes on the market at 6 cts. a pound. Corn is very high. Very little hay for sale. Stock starving on the dry pastures, the recent rain will start vegetation. Business is flat. No pearl fishing, Went to Pichilinga island in a. m. and took photo of Fouquieria Burragei. Seems to be a good species; flowers yellow and buds red, lobes very short and round, about equaling tube, spreading abrupt-



TRIUNFO, L. C.

CEREUS GUMMOSUS

ly. Stamens much exserted: pods short and appressed. Should grow on mainland. Did not see Atriplex macropoda anywhere. This is the type locality.

Oct. 10. It is clouding up as though it was going to rain, but bar. normal, humidity 75%.

Oct 11. The little coast boat, Sonora, came in at 10 a. m. Last night was delightfully cool.

Oct. 13. The boat stayed in harbor two days, fearing a storm but is going out tonight. Got all my stuff on board in evening Sea is calm, making a dreamy afternoon. The Sanvitierra, the copper company's boat from Santa Rosalia came in this p. m., the Bolivar, a federal boat and one other is due tomorrow. Corn is 2 dollars a bushel and hay 4.50 a bale. Cocoanuts and dates are ripening fast,and mangos a little passed the peak. The avocado, shiny kind is on the markets.

Oct. 14. My boat did not go out last night. The Bolivar came in at 8. They say the tide here is 7 ft. At Pichilinga is. there seemed to be no tide for the water almost touched the shrubbery, may have been high tide. This is a beautiful morning. A fine boulevard, just completed, a mile long, skirts the shore. The white and block-like Mexican houses nestle under the rounded ceiba trees and lofty cocoanuts and Washingtonia palms. The leather factory har one small steamer in the bay, idle from lack of work; money too tight. All as quiet as a Sunday at home Oct. 15. We pulled out in the night and.early before day stopped in a cove and landed some freight: then took a small boat in tow for an hour and then cast off and put in to a little ranch among date palms. Formation here is all sedimentary except a little island of eruptive. Seems to be Triassic; may be Tertiary. but too many older strata above it, certainly not Carboniferous. There are great red escarpments, or greenish or white, with here and there sandy beaches. but coast line mostly precipitous. ground color some shade of red. These hills look rather bare but must be fine botanizing in January. Formation very regular and horizontal, cliffs at the back are 2000 ft. plus high. All Tropical. There are pretty little recesses with sandy beaches. No evident signs of water but vegetation greener in the draws. We are now very much nearer shore, a mile off or so, very beautiful as we pass by. The formation dips slowly under to the north, probably all Triassic. No big and hard boulders. Just passed an alcove with dates in it but no sign of habitation but a rowboat high on shore. We now round a point and see a launch anchored out. Country now rather chocolate-colored and looks like a series of horizontal lava flows. Came across 2 pearler boats here. Cardons are scattered along shore, with petaivas and C. Thurberi. Some pelicans fishing. Off the coast in the morning were 3 islands, still visible far away. We now have taken 4 pearlers in tow, one of them is the M. Louisa, the boat I hired to go to Espiritu Santo island.

One of the boats, the Kreuger, has quite a load of unopened oyster shells, Certainly this region is a series of lava flows, but all seemingly stratified, the lowest one rather thick toward the n. e. Wind freshening and our tow shipping water. Our skipper signaled them to set sails. which they did and now riding better. 1.30 p. m. Wind has died down and we are near shore. We are now approaching an island ½ mile long, and east of it is another 15 miles long. Carmen is., which has a high range along the middle . There is a high ridge 4000-6000 ft near shore on the mainland and very steep at the shore, beginning about opposite Carmen and seems to end in a high peak which must be near Loreto (Sierra Giganta). Our tow riding finely now, sails barely drawing now Carmen is. seems stratified, the shore being barely 1 000 ft. high. The slopes of the Sierra Giganta must hava many mountain sheep

Loreto. We had to land in the surf in canoes and got through dry. Got a good room in a quiet place. It now is a little town, going to decay, once the capitol of the peninsula and religious center in the days of the padres, and with a fine old cathedral which is now a crumbling ruin with roof falling in. The town lies on a flat at the mouth of a dry riverbed, and extends to the seashore, a few hundred yards of alkaline soil, growing dates which thrive best under such conditions. It seems to have plenty of water but not runniug and has to be pumped 10 ft by windmills, as is done at La Paz. It is a forest of dates, Sonora palms and ceiba trees, with enormous mesquits 40 ft. high and over 2 ft. thick. No figs nor sugarcane. It is calm and still at sunset. Children stare at me just as they do at the north. Quite a number of husky women and girls here.

Oct. 16. It is bright, clear and still. Old cathedral a picture of desolation in the midst of a beautiful orchard, all caused by the hostility of the cowboy revolution. Went out along the beach to the hills east and got some stuff, very dry, rather hot, was back at 2 p. m, ate some petaiyas, Got a Celastraceæ shrub, with green flowers, the fruit suggests Maytenus, having red covered seeds, straight stems 6-8 ft. high, gray and smooth bark. Farther on got auother similar shrub, but taller and more branched with dark bark and green flowers, and fruit Amelanchier-like and drooping, a Spring leftover, 5 stamens, a disk. no petals, white sepals ridged within and acute The abortive Opuntia is here but taller, also the cylindropuntia like C. Emoryi. C. Pringlei is common, very bald, glaucous and big. C. Thurberi is occasional and more racemosly branched. Saw and photoed one petaiya 20 ft. long and decumbent (see cut). The viejo cactus is common, also Fouquieria in full leaf and branched racemosely, but is not Burragei, flowers few and fruit clusters small. The lead colored flowered Lycium has red and small berry. Many shells on the beach.

LANDING IN SURF, LORETO

LORETO, LOWER CALIFORNIA

The pearlers collect various shells for pearls as shown by the tons of univalves on the shore. The pearl shell most sought is not an oyster but a symmetrical kind of clam about 5 inches wide The beech is low and not steep, as it is at the Cape, probably the Gulf between here and Carmen island is shallow and relatively close by. Dates grow best here in alkaline soil. The Sonora palm is ripe and 50 ft. high, none self-shedding. Got a smooth Jatropha with leaves purple-tipped and flowers drooping as in Vaccinium and cymose, bark gray. Bursera here has smooth white bark not shredding up and in fruit has copal swellings. The viejo cactus has 5 ribs normally, often almost spineless below. Humidity at 3 p.m. 70%. Have seen no Tecoma so far. Just arranged a trip up the mountain for 5 pesos a day for 4 mules and young Garizar as moso starting ln 2 days. Prices cheap here. Went down to the western beach and got many shells. There is an Erythæa growing here which seems new and which I shall call E. Loretensis. It is glaucous, as is armata, petioles spineless, seeds oblately round and lozenge-shaped, black, ¾ inch wide, tree with persistent leaves: flowers in panicles like those of Brandegei on peduncles half as long as petioles, outline lanceolate and barely surpassing the leaves; bracts very small and green, not sheathing, acuminate, inconspicuous; segments of leaves taper, as in Washingtonia and ending in threads: erect, 25-30 ft. high.

Oct. 17. Clear and still at 8 a.m. Boys helping me dry driers, crazy to do things. Humidity 67%, bar. normal, breeze now from n.w. There are 2 ceiba trees here with spread of branches of 20 ft. each and fig-like trunk 3 ft. thick, leaves elliptical-lanceolate. Night. Went east horseback to the hills and got pretty sore from riding but got quite a bundle of specimens. One Eriogonum is new, of the perenne group, with capillary stems, glaucous, and branching 2 ft. in all directions, in sandy soil. Got Stegnosperma shrub a foot high, with white flowers and glaucous leaves. Very dry. The Fouquieria appears peculiar, has some flowers and fruit. The cardon is glaucous-gray with white spines often almost abortive, probably the cause of the name "calvus" bald, a good vsrietal name. Stems very big. Got a coarse annual 3 ft. high, with habit of Stillingia, Sebastiania sarmentosa. There is a shrubby Snæda here, 4-6 ft. high. Spirostachys is often 4 ft. high and woody almost throughout, very common on sandy flats. Went to base of hills, but strata coarse there, Pleistocene. Got some fossils like the living shells in the sea, strata in black mud. Humidity at noon on hills 18 percent.

Oct. 19. Humidity 68 percent, bar. normal. Primiera Agua 9 miles west of Loreto in the foothills of the Sierra Giganta 400 ft. alt. Humidity here 28 percent. Vegetation the same as below barring alkali stuff. Washingtonia common, Tecoma stans

coming in, no Yuccas nor Erythæas, Cereus Thurberi and gummosus also absent; water rather much in the volcanic ash seeps but is good and has a Polygonum in it like the Cabo one, and another aquatic. Eustoma is here, also Cyperus, Eleocharis and Cenchrus, no grasses to speak of but devil grass. Olneya is common from Loreto up. Dates, sweet lemons, limes, oranges mangos, guavas and pomegranates are grown here. There are 2 Populus Fremonti. Hills very dry. Saw one specimen of the tufted Cabo Cereus with flowers red and 1.5 inch wide, also Mamillaria Poselgeri is frequent. They have a big and warty sweet lemon with thick skin and another with big navel that are sweet. Their oranges are beset by a chocolate scale which yellows them considerably too early, trees 40-50 ft. high and full of fruit. Figs and grapes are out of season. Much Washingtonia cult. here.
There are several ponds with Typha and Scirpus in them and one Cyperus and Seymeria. In the orchard are 2 Euphorbias: also saw the new Sebastiania and got specimens. Petaiyas are ripe and in flower, C. Thurberi has 14 ribs and the cardon not over 10, the viejo mostly 5. The soil is volcanic in horizontal flows. Evening. Went through the garden twice and got a great load of stuff but nothing startling, but all good. Capparis here is a tree 3 - ft. high, with gray and snooth bark, trunk fully 1 ft. thick and erect and appletree-like, flowers as if in racemes. and fruit an oval seed, berry, or drupe, Baccharis sergiloides just in flower. very graceful as in Adenostoma sparsiflorum, about 8 ft. high, in bottoms and moist places. Eucnide is on sandy bottoms and 3-4 ft.high. Saw Jatropha urens. The evening is delightful, with no wind. The day was hot. The water flow is about 2 miners' inches and comes from the north bank, enough for the garden and very fine water too. A watermelon Cucurb. citron? has smooth and green fruit striped, stems 20 ft. plus long. There is much palo blanco.
Oct. 20 Humidity 88 %, bar. high. Clear and still, will be hot. Left my bundles here while I went horseback up the creek to the upper ranches. The Iuca ranch is 800 ft. alt. Very dry here, with water in the gulch. Coming back I got an Agave on the rocks, also Mamillaria Poselgeri. Humidity 70 percent My moso cuts Parkinsonia microphylla for his mules and also the cirhuela, Turnera. No grass here, sheeped ont. Magnificent scenery all along for 5 miles. Strata level and overlying eruptive, with here and there an eruptive dyke cropping out. At Primiera Agua there is a split in the strata. At about 4000 ft. alt there are no oaks visible. The palo blanco is everywhere. Cereus Pringlei is scarce and Thurberi is more common and so is the petaiya and viejo cactus near the middle ranch. Got a magnificent Plumiera growing wild on trail above. It has the habit of a willow, with smooth red flowers and pods 3-5 inches long with cottony seeds and is 2-valved, the flowering stalk is 10-15 inches long and at last florif-

erous on the upper ⅓ with alternate clusters, but panicle not over 2-3 ft. in all. (The peduncles 10-15 ft. not inches as given). The Eucnide here does not grow on rocks. Got a Compositæ shrub with narrow panicle stalked but not over 2-3 ft. in all. There is a Hymenoclea, 10-15 ft. high, with rough bark and trunk 4 inches thick, with airy panicles at the ends. Saw a Passiflora with white flowers 3 inches long, several times. Weather hot and dry. Distance to first ranch a short 3 miles and 2 more to the upper. About the same water in each. A very fine grotto on the first ranch, used as a bathing place.

Oct. 21. 8 a. m. Humidity 100 percent, bar. 211 ft. Clear and still and no sign of storm but humidity too high. Slept well last night. My skin on arms burned yesterday as if poisoned, and feels tender today. Moso says mules will not eat palo blanco but very fond of palo verde and the Turnera. The high peak south of here seems to be like the first one an abrupt escarpment on the eastern side and rather sharp on the west also, at least near the top, and seems to have palo blanco all the way up, there is little evidence of oaks anywnere. The Pleistocene sediments go about to the middle ranch and then stop.

Oct. 22. Got to Garizar mill 3 miles below the Cayuca, at 6.15 Alt. 675 ft., humidity 30 %. Getting cloudy at the west. Mesquit large, palo verde very common. Vegetation greener than at Loreto.

Cayuca ranch, 2.30 p. m., 1000 ft. alt. Humidity 58 percent. Got many things in the box canon here, some ferns. Clouding up with some fleecy clouds. We are about a mile from the precipitous face of the mt.

Oct. 23., 8 a.m., bar. 600 ft., humidity 92 percent. Fleecy clouds, looked a little like rain last night but did not rain. It is still this a. m. The old Garizar mill above here is a quaint old ruin, built by a trusting Mexican, on the word of a man who said a rusty iron seam was a gold vein, built at a fine waterhole where water was plentiful, seeping out of rocks, the solid stone house and fine well and ample yard with great shading mesquit with 81 ft spread and 40 ft. high made an ideal situation, but all for nothing. Got back to Loreto at 11.30 of the 21st and stayed all night and the 22nd. started for the peak and at 1 p.m. unsaddled in the brush for noon where there was plenty of palo verde for the mules. Got to the mill for the night, 3 miles from Cayuca ranch., here was Bursera, Sapium, Olneya and some Antigonum, cardon, C. Thurberi, petaiya. The cardon shows the calvus form well. Saw one fruit, the first seen. The 23rd got to Cayuca ranch at 2.30, 1000 ft. alt., humidity 58 percent. Mules ate even the twigs of Turnera. Last evening we went 2 miles up the big barranca coming back by the water canon and getting a great load of stuff, mostly shrubs. The Franseria is 8 ft. high. with woody

canes and bright-yellow flowers. Got a yellow Lantana. 6 ft. high but branched lika the rest. Ruellie peninsularis Rose is very common, but the blue flowers scarce as usual. Saw one cardon with 27 branches a foot thick. There is one hybrid here with Thurberi here, never saw any more.

1 p.m. Got back from trip to cliffs and reached 1499 ft. alt. Vegetation the same but greener. Got quite a mass of stuff, but nothing very marked. Followed up the main canon where we left off yesterday. From specimens of Fouquieria seen at Loreto I noticed variations toward Idria making that genus a vegetative form of Fouquieria. This therefor becomes F. columnaris var. peninsularis (Rose), which is specifically distinct from splendens The form here branches like other shrub genera but the trunk tendency is toward intumescence as in Idria at base. The little Mamillaria occurs everywhere and with scarlet fruit linear-clavate. The yellow-spined Opuntia is a little more slender than abortiva and with spiny or smooth fruit and does not proliferate. Evening. Saw the same Agave as at Primiera, in full fruit, may be a Hechtia, 3 ft. high, with linear and rather open leaves. There seem to be 2 species of Agave here besides the long and narrow-leaved one with close-set black spines which are inclined to be flexuous, flowering stalks over 10 ft. high.

Oct. 25, 8 a. m. bar. 1000 ft. alt. humidity 90 percent. Clouded up some after dark, still and warm last night. Ready to start. Vegetation here mostly petaiya, Pringlei and Thurberi and some flat Opuntias, 2 Jatrophas, Fouquieria, 2 Acacias, palo blanco and verde , 2 Prosopis sp? and a few other shrubs, annual Setaria Panicum, Tribulus small sp., Amarantus, Trianthema 2 sp., Agave on cliffs by water, no Yuccas anywhere, nor native palms. The cardon here very big.

Got to Arroyo Undo ranch and water at 11.30. Fine water is fenced in in a gulch a mile to the south. The water in a hole in the bedrock at the house dried up along the creek. Went up half a mile and got an oak and turned back because of the dryness, and saw our mules hiking down the trail for home and so told the moso who set out after them. Here we are at the upper limit of the cardon but the other cactus are here. Celtis coming in; brush taller; much Sapium 10-15 ft. high, the many stems greenish-brown: many Ficus Palmeri. The soil is still dark and volcanic, with niggerheads all over, menacing the feet, trachyte, little sign of basalt, looks as if it had been erupted in water. Decided not to go farther toward (25 miles off) Comondu because of the dryness. Trail poor. Coming up from camp we ascended 1000 ft. in a mile, over a monstrous ledge. Shrubbery the same here as below but Fouquieria less common and broad-leaved and Jatropha almost gone. Saw some walnut trees among the oaks but no fruit. 2200 ft. alt. humidity 78 % at 3 p. m. Fleecy

SYCAMORE CREEK, TEXAS

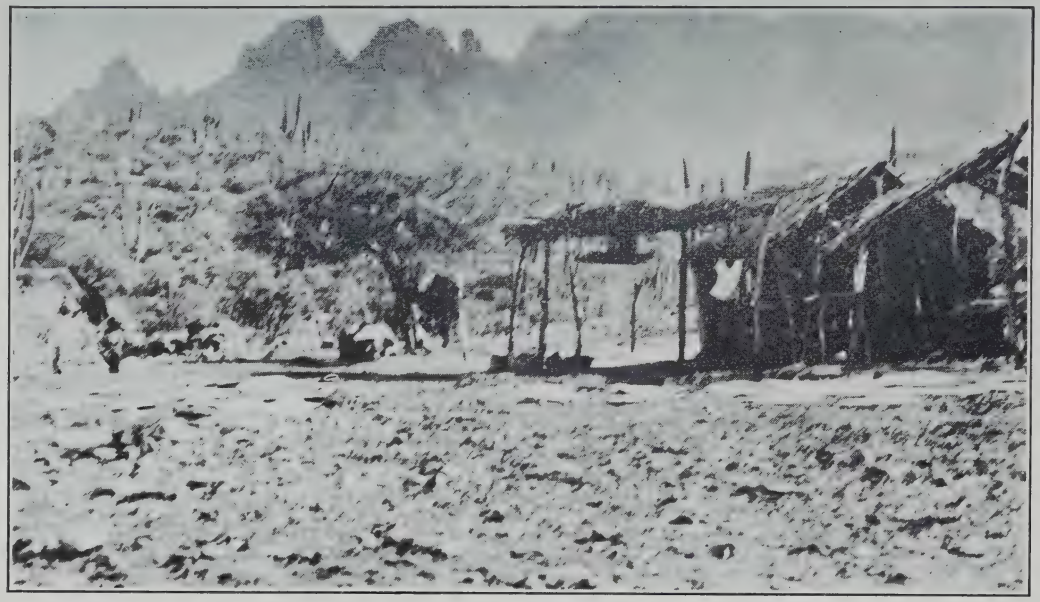
ERYTHEA ARMATA

clouds. There is an Acacia here with white flowers and hooked spines that is very annoying and at all elevations, rarely 10 ft. high, but have seen little fruit of it. The persimmon is a shrub about 15 ft. high, but have seen little fruit of it, also got it at Primiera Agua and could not tell what it was till I got the fruit. There is a wasp here with nest hanging down horizontally like an inverted plate, 4 inches wide, others tongue-like hang from twig ends and cliffs. The wasp is narrow and yellow and rests on the water like a skipper and does not wet its feet, and flies from it easily, have seen hundreds of the nests. There are other wasps that make nests on tree trunks like a dirt covering, and 1-3 ft. above ground. The Sapium has almost every fruit bored and eaten through. The berry is 1-3-seeded in each fruit, mostly 2, hemispherical, striped and dotted when not eaten Erythrina Mexicana is frequent, with trunk 20 ft. high and 1.5 ft. diameter, smooth and gray and rather tuberculated on some branches like goitre: fruit pendent, long-beaked, with seeds scarlet and with a pulp-like filling between. Saddled up and went down to the Cayuca ranch which is just a shelter beside a big corral and is thatched with palm leaves. It has a stone wall 4 ft. high, and is the merest excuse for a home. Will not rain tonight. We are on our way back and I am not satisfiød with what I got because of the dryness, but it will be drier on the western side. There are many more flat Opuntias here with yellow spines and big joints Asclepias subulata occurs also. In a gulch got a beautiful mint 6 ft. high, with many slender stems gray and erect among loose rocks at the bottom. Also found a small tree 10 ft. high, Prunus ilicifolia without fruit. There is a beautiful amphitheater here a mile wide with precipitous face near the top, 500 ft or more high and with many liveoaks along the upper slopes and in draws below cliffs. Strata horizontal but all eruptive in layers 2000 ft. thick. Saw 3 people today, on their way to Comondu. Palmer figs very tall. Saw a puddingstone boulder 30 ft. high overhanging a gulch. Am getting over being sore from riding.

Oct. 26 Arroyo Undo, 7.30 a. m. Just began to rain gently, sky all overcast by a thin cloud, sun coming up in the east; they say it may rain all day. The owner of the ranch came down from the waterhole above which he reached yesterday noon and stayed all night with us, another man came just after it began to rain and so there are 4 of us now under the meager shelter. Got all our stuff out of the rain. Mules are tied to the brush on the water trail. Bar. 2100 ft. and indicates little rain, humidity saturation. Seems good to have some rain at last., cool night Yesterday had impaction of the colon and had to dig out to save myself, a painful job, due to Mexican cheese which I ate, and from no other cause and so I took a laxative to restore normalcy.

After a time the men took my tarpaulin and tent and put them on the roof to keep out the rain, and now we can be dry. the tarpaulin leaks a little at first, probably will swell tight soon. 8 a. m. Steadily raining; everything outside is wet. Shelter leaks some but tent does not, soon a boy came on horseback, and now we are 5. Rain keeps falling, but looks thin to the east, waterproof cover to hat comes in handy this a. m. There is some wind from the west. 8 30, has stopped raining but looks dark all around still. Probably ¼ inch rain fell in all. Wind still strong from west. Bar.2000ft. 8.45 Heavy clouds from the west falling below the top of the mt and moving fast to the n. e.. Sprinkles once in a while. Does not look good yet, Brighter to the n. w., but clouds still low on mt. and raining. Wind still a breeze, but barely sprinkling. The palm thatch on shelter seems to have too narrow petioles for Washingtonia, and many with no prickles at all and few threads, probably are Erythea Lorensis. My paraffined tent is not wholly waterproof. I should think 10-oz. duck would be about as impervious as my tarpaulin which was guaranteed to be waterproof, but not so at all. Weather cold. The owner says the palm leaves came from the south side of the mt..for there are no palms here. Whether he means at Parras or Primiera Agua I dont know, but none of Erythea since we left Loreto. Clouds still at the west but low though brighter to n. w., but no sky visible yet. Just out of Loreto we passed a clump of Larrea in full bloom. This shelter has a fine 3-foot wall of stone and a stone corral. Bar 2050 ft. They say this is an exceptional year for dryness, usually much rain in Aug. to Nov. The waterholes are all so dry in many places that the ranchers had to move out, but stock could get water in isolated places. Cattle look in good condition, mules also. 11 a.m. went down to canon n. e. and got quite a load of stuff. The red Mentzelia was on the rocks, and saw Eucnide there, got a bush Brickellia-like shrub stragglingly branched, 3-4 ft. high, saw Stegnosperma. Got Evolvulus, a low Franseria like ambrosioides but perennial (Ambrosia?), The big bush one is common, acerifola n. sp. Got a bush Anoda. It rains by spells a little and looks very dark to the east, but storm comes from the west. The boy seems to have gone. The young man who came first started to go but turned back. It is sprinkling now and the men are loafing, clouds far down on the mt. and below us on the east. Mists a little now and then. Liable to be here all day. Could as well go to Cayuca ranch but moso not inclined to start. Horns of mt sheep are here as well as white tailed deer. They say they are frequent on the mt. Argemone hispida I see here, 3 p m, storm is over and clearing and very blue sky. Feel fagged but have done nothing today but loaf all day. Moso is taking mules down the road and brought them back and saddled up and we went to the Cayuca ranch as noted above.

GARIZAR RANCH



CAYUCA RANCH

The last half of last sentence on page 108 should be omitted for we stayed all night and went to Cayuca ranch the next morning as noted below.

4.30 p.m. Went across gulch to see what I could find and Got a Selaginella spreading and rooting over the ground in large patches, 1-3 ft. wide. Also a Cheilanthes (Pringlei?) under rocks and barely in fruit. Got a few others also. Clouds still hang low on mt. but no rain, getting dark.

Oct. 27, 8 a. m. Rained a little last night. very cloudy but clearing now. Bar. at 2000 ft. Humidity saturation. Will be clear and hot today. Everything is wet, mules look a little gaunt, vegetation seems perfect, cool and delicious. Will get off by 8 a. m. Hope to get to lower Garizar ranch today, 4 miles below Cayuca ranch early so that I can dry out. Clouds going s. w. In the center of the amphitheater at Arroyo Undo is a big draw with with many dark-green trees, probably Celtis pallida which go to the bottom of the big cliffs. If it were a little more humid it would be fine for ferns. The so-called "palo fierro" is an Acacia for I saw the flowers, not papilionaceous but with few flowers. Palo blanco is common, both Jatrophas are here, one with smooth and glassy surface and dark-green leaves, but never common, the small and shrubby plant with spike of small and greenish flowers on rocks seems different from the taller one on bottoms, in leaves. Will get off at 8.40. Got to Cayuca ranch at 10.40. changed driers there and put in fresh plants by 12.45. Got dinner of coffee and cake and fish or cheese and are about at the end of comida, may get to Loreto tonight if we drive late, should get off by 2 p.m Bar. 1050. Feel somewhat tired. Coming down I found the hill is 800 ft. high to the level below, and from there here is 200 more Rained here as much as with us. Cereus Thurberi branches near the ground, and Pringlei 2-6 ft. above and branches seldom with nodes, Thurberi almost never. Some men passed us on their way to Loreto with dates as freight and came back today empty. The "palo fierro", ironwood of my moso has straight spines an inch long and has much gray fruit 3 inches long and is common here.

4 p. m. reached Salto ranch below mill. They have a well here 30 ft. to water now. Usually there is much water in the creek where the bedrock crops near by, but is dry now. Fouquieria it not in leaf here, Cercidium and Prosopis are here, much C. Pringlei, some Thurberi and Capparis which they call "palo San Juan", Ruellia, Iresine seslerioides are here also. The volcanic flows are tilted 15-29°to the east. Saw a Larrea 10 ft. high a few miles back in a gulch, also got it here; fruit ¼ inch long, elliptical, deeply 5-grooved and splitting into 5 carpels which are nearly closed and are white-spreading-hairy, otherwise as usual and flowers with yellow petals rotate-spreading and turned edge-

wise like propeller blades; stamens 15, somewhat recurved once in a while, united below into a disk: ovary smooth; seeds lunate, acuminate at both ends and much so above and hyaline and vacant for ⅓ their length, with a ridge of material along the back and less evident on the belly, with base vacant but shorter and seed showing through, much flattened laterally and sharp on both edges, as long as pods, 1 in each cell. The generic character has 10 stamens Stegnosperma, growing here has flowers white, and petals cordate-ovate, on a short stalk, reflexed, a little longer than the pistil which splits into 5 broadly linear and truncate branches, stigmatose ¼ the way down on the inner face, but finally reflexed and separated. The woman here fed us on rice, fresh cheese and coffee: is good to get a little to eat after ours ran out.

Oct. 28. Bar. 400 ft. alt. humidity 90 percent Quite cold last Clear and still this a. m. They have 10 calves here. The cheese was fine last night. In a Cereus Pringlei tree here, 1.5 ft. diam. a dead one all rotted out, the central half foot was hollow where the flesh had been, then came the woody bundles where the ribs had been, wood very soft and pithy and of many layers which split into many long strips forming poles used for rafters for houses. There is total absence of any means of heating except by open fire and nothing a t all to warm any room, and no need for any here. Right here at the ranch the ochotilla is partly in leaf, showing previous lack of rain and the scarcity of water and need of wells and absence of fruit on the cardon shows the same. The petaiya has a few flowers and some fruit and all its stems tend to lie on the ground and root on the under side, forming new plants for I have seen stems 20 ft. long, with new shoots along and forming new plants but still connected with the parent. Thurberi branches close to the ground mostly. The mules eat Trianthema greedily. Got home at 4.30, and pretty tired from the 20-mile ride. It rained here some from the n. e. and windy this p.m., and sea rough. Got Larrea soon after leaving ranch and it was common to 10 miles out and seems like ours but taller. Cercidium pallidum and Parkinsonia microphylla look much alike, but in leaf are very different, the latter is the best mule feed, except Turnera, but mules eat Trianthema and any Malvaceæ. The top of the hill north of Loreto on the way to San Bruno is 700 ft. alt. and will have to be graded before autos can pass. The Sierra Giganta as understood by the natives is the the high peak n. w. of Loreto, but in fact should apply to the whole range. The alt. is about 6000 ft. with liveoaks nearly to the top. The range is formed of horizontal eruptives worked over in water and cut off on the east by faulting at the crest along the axis, mostly free of shells except below 1000 ft. alt. where Pleistocene sediments begin on the mesas There are many fine fossil beds particularly at the SanBruno summit on the wagon road. Trails are good

except for small niggerheads all over the upper reaches where they hurt the feet. There is some alkali on flats and much Spirostachys and shrubby Suædas. The ground produces the best dates on the coast if drained.

Nov. 1, no word about steamer yet, but it is due today from the north. Yesterday a Chinaman struck me to buy some pearls but I was not in the market for them but offered him half his own price to get rid of him, which he refused. Went out a mile or so to the n. w. and got a few species, an annual Euphorbia that may be new, very common there by tank. Aplopappus diffusus is in bloom there. This a. m. the Chinaman called and put the gems in my hands saying they are yours at your price and so I was in for it and pungled up the 20 pesos, for 7 pesrls.

Nov. 2, a Copper Co's boat came in today to load wood, and expected to hang around for some days. No word of the Sonora yet. Clear and still., 0 ft.high, humidity 91 percent., actual alt. is about 25 ft.

Nov. 3. The Sonora is in going south. The Corriente goes north tomorrow, and I will take it to Santa Rosalia. A fine young man from Todos Santos called on me. Weather lovely and hot, wet heat. No rain. Went east and got Suæda, shrub 3-6 ft. high and straggles up among the bushes but often flat on the ground. There seem to be 2 sp. of Lycium here, both 4-10 ft. high, much Spirostachys. Steamer departs in p. m., almost packed up, looks like a general storm is brewing; may have rained a little last night· Got a berth and am all set now and ready to go north. The men aboard can talk English some so that I can visit a little

Nov. 4. Got to Santa Rosalia at 4 a m. Warm and still, many people here. Hills with little vegetation and very low brush Three palms in plaza but no sign of blooming ever, but may be the Sonora palm W. Sonoræ. There is a palmetto cult. there, Went out 10 miles to the Muleje road by auto and found veg. more starved. Larrea is about 3 ft. high, on uplands and 6 ft. high on flats and is very common . Also Encelia farinosa, Jatropha canescens is rarely over 5 ft. high and with the big bases of trunks very scraggly, and so is the purple fruited Bursera. Fouquieria peninsularis is also common and low. Aplopappus diffusus is on some flats in bloom, Stegnosperma is 4-6 ft high, low forms of Prosopis occur, Cereus gummosus and Schottii are common but very low, Pringlei is on flats only, the yellow-spined Opuntia is the only one and scarce. No grass. Nothing but scanty shrubbery. The big bracted Celastraceous climber I also saw, 3 ft, high here There were algæ in an aestuary south of the road which is very winding and rocky near the sea. Rosario is 65 miles north and Muleje 41 south. I disembarked here intending to stay but the flora in bloom was too meager for me and so at 5 p m I took the same boat for Guaymas and am aboard. many passengers going. Fleecy clouds.

Nov. 5, Boat left Santa Rosalia at 8.30 p. m. and got to Guaymas at 6 a. m. Got off boat and to hotel by 8 a. m. Got mail at last. Very dry and warm here, no rain in a long time, clear and still. Am answering mail today. Hired a launch to go to mouth of harbor and got a few things but too dry. In p. m. took auto to Miramar and Empalme around the hills to study palms to the north and west but found none wild, very dry everywhere, Parkinsonia aculeata on slopes and much mesquit, dense Cereus Pringlei on islands but scarce elsewhere, C. gummosus scarce, Schottii frequent and small, Bursera, Jatropha and other L. Cal. shrubs the same species but less common though Larrea and Prosopis are more common, Encelia farinosa is everywhere, Aplopappus diffusus is frequent, and so is Wislizenia in cult fields.
Nov. 7. took baggage to depot for Mazatlan but agent refused to check 9 of my bundles and said they must go by Express. As it was I had 100 lbs extra baggage for which he soaked me plenty, but after an hour I am now all ready to start. Clouding up a little but not warm. The hotel porter is fine help, 50 years old and gray. It has been beautifully cloudy all day.
Brandegee surely was wrong when he said Erythea Brandegei was common on the coast. The only fan-palm is Washingtonia. I suspect the stray ones I saw on the Lagunas in 1928 were Brandegei, and I saw but one little one at San Bartolo where he said it was common. There are none at Santa Rosalia nor Guaymas. At 7 p. m. it rained enough to make the streets muddy, heavy clouds and much sheet lightning coming up from the s. w. and no wind. Went to station at 1 p. m. and it began to drip and got worse all the time. Train pulled out for Empalme at 12 where I had to change to Pullman. Moso proved to be a grafter and stuck me 6 pesos too much.

Nov. 8, Rained all night. Pools of water on the ground. Vegetation has been very dry going out. Bar. 75 ft. alt. Much Prosopis, Franseria acuminata, Cereus Pringlei and Thurberi, a straggling Opuntia leptocaulis, also a cylindropuntia and a flat one, the pink flowered Echinocactus Wislizeni and a beautiful Cæsalpinia in flower. No grass. Things just coming into leaf, a tree, Acacia? near kil. 718, Bombax, Capparis, no Fouquieria, some Larrea, now an occasional Fouquieria in full leaf as we go along, our heavy train is slow, Stramonium, Teucrium, shrubby Heliotropium in flower; vegetation 10 ft. high: ground bare, an occasional persimmon: low mts. on the east; Bombax in flower at kilometer 725, and at 729 we cross a river 150 yds wide, and a R R. going down river. 9.20 a. m. sugar cane and dates. San Blas Sonora, not the city on the coast; an old, old town. Country now looks pretty wet and soggy, much cylindropuntia now, Prosopis very common, Lysiloma, not candida. 10.15 a. m. It is raining again and somewhat chilly, still soggy, keeping near the

CANOTIA HOLACANTHA

LA BARRANCA

FOUQUIERIA BURRAGII

coast all the time, but cannot see the water. Much fan-leaved Lysiloma 30 ft. high, persimmon; cactus scarce. Kil. 829, mostly Legumosæ shrubs coming into leaf. The Manzanillo Mimosa now. Hot, heavy rain here, Franseria ambrosioides, some undershrubs coming in, pumpkin vines along small river. Kil. 837, Culiacan, Guamochil, a small town. Had much rain here, just saw a grove of Sonora palms: very cloudy and still, mostly leguminous bushes and few cactus such as Cereus Thurberi. Everything wet. There is a low, 4 ft. high, Jatropha common, like canescens. The settlements all have palm-leaf roofs, low mts. far to the east. Crops all harvested and they are plowing for new crop Vegetation 10 ft. high, and much the same as at the north Big-leaved Cassia?. More stock at Culiacan, everything wet and muddy, clouds going slowly, vegetation very green; people all appear happy; many scrub goats and sheep with tails not bobbed. 2.30 p. m., ours is a train of 12 cars, all passenger and Express. 4.20 p. m., raining again, much Crotalaria and Antigonum, country soggy, much Lysiloma, some Cereus Thurberi and Pringlei, a few big leguminous trees 40-50 ft. high, country normally wet, beans, bananas, sugar cane, some weeds. La Cruz a pretty town by a river 50 yds wide, charcoal in pits, bananas, Plumbago scandens in bloom. We are now by the ocean, still wet, little cactus Dimas, quite a town on the eastern side of track. and with river 200 yds. wide showing traces of a great and recent flood with muddy water. Mazatlan, cool here Got here at 7.30 and went to hotel Del Mar by the sea. Mud everywhere, very cloudy outside.

Nov. 10, 9.30 a. m. Slept well, weather muggy and raining at sea and sprinkling here, road bad with mud and it looks squally to the n. w.

Nov. 11, soggy, wet and rainy and very cloudy. All my baggage came yesterday. Got everything ready for the trip to Guadalajara and stored 8 bundles and valise here.

Nov. 12, 3000 ft. alt., grass knee-high, Epicampes grandis, Andropogon and Aristida, big Tuna and Cereus Pringlei, now we are passing a cult field of Agave: Helianthus or Tithonia, Stevia; flowers everywhere, some big leguminous shrubs, Bocconia. Tetitlan, on the east is a volcano that has erupted since the railway was built and the lava flow reached the track, white ash above and black lava below, rained hard yesterday, 3300 ft. alt. a charcoal station, it looks like the Ixtlan region, near La Barranca, now see many large shrubs with white and funnel-shaped flowers, Bombax or Apocynaceæ, much grass everywhere, Dalea little feathery flowers and tall plants 2-3 ft, high, much red or orange Dysodia 3700 ft. alt., Bambos vulgaris. water very dirty now, we are near

the liveoaks now, grass shorter, clouds lying low, kil. 1613, barrancas appearing now, 4150 ft. alt., everything wet, much charcoal visible now, have waited here an hour at La Barranca, they say a slide has blocked tunnel no. 19 and that we must transfer to get through 10 miles from here. Time has not changed this town any for the roofs are still covered by old tin from 5-gallon gas cans. There are a few scattered liveoaks. Got here at 12.50 and stayed till 3 p. m. when we went to the tunnel and walked to the other side in the rain, carrying our baggage with us and waited an hour for the relief train from the south when we climbed aboard and are now waiting to go at 4-30. Wont get to Guadalajara till late but I got a few sp. by the track while waiting. We have a big load of passengers and are about 4000 ft. alt. See no liveoaks. Still drizzling at 5 p. m., 4400 ft. alt. Good view. There are several ridges or ranges in view now, slopes very steep and all bush 30-45 ft, high, big-leaved Senecio with yellow corymbs, also a white flowered sp. A small Dalea, very feathery, Eysenhardtia 4-6 ft. high, saw a Cucurb. with leaves like Megarrhiza a vine, several Euphorbias, much tall grass, stock in fine shape, people seem happy but huts squalid. Much sugarcane, been cut a long time and over-ripe and piled in heaps, oranges about ripe, see some mango trees but no fruit, plowing in places, water running everywhere, tall grass like Tripsacum 6-8 ft high, Eragrostis Purshii, 2 sp. Iresine, Buddleia, 3 white and purple mints.

Nov. 13. Got to Guadalajara at 10 p. m., in the rain and went to Phœnix hotel, 4500 ft. alt. Too much style here for me. Hired an auto to take me to La Barranca, not the town mentioned above, it is grand, on the plan of the Gand Canon but smaller, a box canon, 2000 or more ft. deep where the Lerdo river makes a hairpin curve at the junction with the Satiago, much vegetation. Called on the U. S. consul but he was out, rained all a. m. but clearing a little at 2 p.m. Called on the Cong. minister Mr. Kem and got him to recommend a good rooming place, Villa Florida and got my baggage all there at last. Tried to find the Cong. Institutio Colon school but the car driver took me far out in the country and back without getting there.

Nov. 14, still drizzling this a.m. and does not look as though it would ever clear up. There are 2 magnificent trees in the patio, 75 or more ft. high and 3-4 ft. diam., Ceibas?, with simple lance-acuminate leaves, not fig-like trunk but more like an oak or ash. Houses here are more spacious and with large central courtyards. There are epiphytes growing on the trees as in the jungle. Went down to the consulate to meet a Mexican botanist, Prof Puga and am to call on him Sunday. Had a visit with him but he cant talk much English while I can only murder Spanish with the resulting poor progress. Clouding up some or at least is not raining Will botanize this p. m. Distances are long but am getting oriented, my feet hurt some and get tired easily and feel fagged already. I do not eat much. Palmer and wife from

Pomona are here. Night, spent 3 hours botanizing to the east but did not get out of the city, but got a lot of stuff, There are bananas here and all sorts of fruit. they say it frosts some here Down town are places where they sell Cal. oranges, Woodbride and Wenatchee Wash. apples. These are the best fruit on the market. Very cloudy and a little drippy in p. m. with very low clouds. Did not get tired.

Nov. 16. Yesterday at 8.30 a. .m. the Parkers and I took an auto ride to La Barranca, and I stayed and they returned. I went down the tram a way and then took a trail and soon came out on a 6-foot way paved with cobblestones leading down to the bottom an old highway and still very much used for it was full of wayfarers. It is the most tortuous one I ever was on, skirting precipices 1 got only half a mile before I was loaded to the ground with specimens, a very rich flora of all kinds including grasses and shrubs, Anemia, 3 sp. Natholæna, 1 sp. Abiantum, 1 sp. Pellæa, 3 sp. Selaginella, Mentzelia?, Rhynchosia atropurpurea, several sp. Dalea and Salvia. I surely got loaded by 3 p. m. Rained on me twice, then started back lugging my load. At the top there were 3 eating booths where I got a bite to eat, and then left my load by the fence to go and phone for an auto at the house, but there was no phone there, but they said an auto would be at the booths for passengers at 25 cts· each. I was too tired to walk the 5 miles home and so went back to the huts where they said an auto would be there in half an hour: so I stooped to tie my bundle better when a machine came in. The driver said in English "Get in" which I did and was whisked home. I offered him 50 cts extra to take me to the Villa which he accepted and landed me there at 4.30. I arranged with him to come for me Monday Sunday noon. I went to visit Prof Puga at his home at Sonata Guierra No 30 and visited an hour and saw his herbarium in little books and poorly named by Rose. He is a pharmacist in college. Got all but the Apocynaceous tree with long white flowers. Not all ferns are in condition to collect, one more trip will take me to the bottom. Weather fine all day. Some liveoaks appear on the benches but no pines. Nov. 20 Cold and clear this a. m., got a good rest, will loaf the rest of the day, spent forenoon in drying all my plants of yesterday in driers and will try to change some this p. m. but is clouding up· Am all ready for another day at the barranca. The river that comes from the n. e. is the Lermo but the Sentiago comes from lake Chapala.

Nov. 19 My auto man did not show up. I waited till ten and then phoned for another and got down half way and got another load of stuff, then back to the top where another auto took me home, Got some teosinte today, evidently a native of rocky slopes as corn grows wild here. Got a new sp of Clematis near the top

There are many self-pruning Washintonias here with varietal leaves of all forms, but no Erytheas, all cult.

Nov. 20, went to the barranca this a. m., without breakfast to catch car at plaza. Got down about a mile before I was loaded again It was hard work to lug back up at 2.30, but an auto was waiting so that I got home by 4 p. m. and feel tired. Found a peculiar Liabrum and all sorts of stuff, but did not get the Apocynaceous tree, for I had too much to carry as it was. Got a big Triumfetta and a Dalea and feel fagged. Weather fine all day. Got a big Desmodium and a peculiar Composite, Verbesina crocata, straggling upward over bushes as our Nemophila aurita does, but a shrub, with 3-winged stems, 6-8 ft. high and almost a vine and spreads all over and is coarse. Nearly clear now. Will spend rest of day changing driers. Slept well but had a hard time going to sleep.

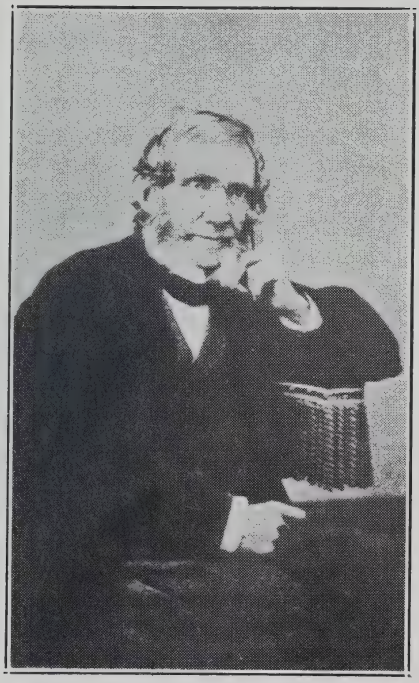
Nov. 21, at 8 a. m. went to the barranca, getting there at 9 and got down to the meadows and botanized on the north. Got a load of stuff, 3-5 grasses and the Tripsacum and a tall Andropogon, cane-like, also the Apocynaceous tree. Will have at the least one more day there before I get to the bottom. There is a Composite, allied to Heclastocleis but not yet in flower. The meadows have more species than I expected to find. Got a tall Adiantum, and home by 3 p. m. Will not go out again today for I feel tired.

Nov. 22, am quite rested up. Went down to get a cover for my broken hygrometer, shops not opon yet. Took off a great lot of driers this a. m. In p. m. went east to city outskirts and got loaded down with 2 Cucurbs., one like a cross between a cucumber and watermelon, with a fruit 2 inches long and striped and smooth: the other a very spiny Echinocystis, creeping herbs.

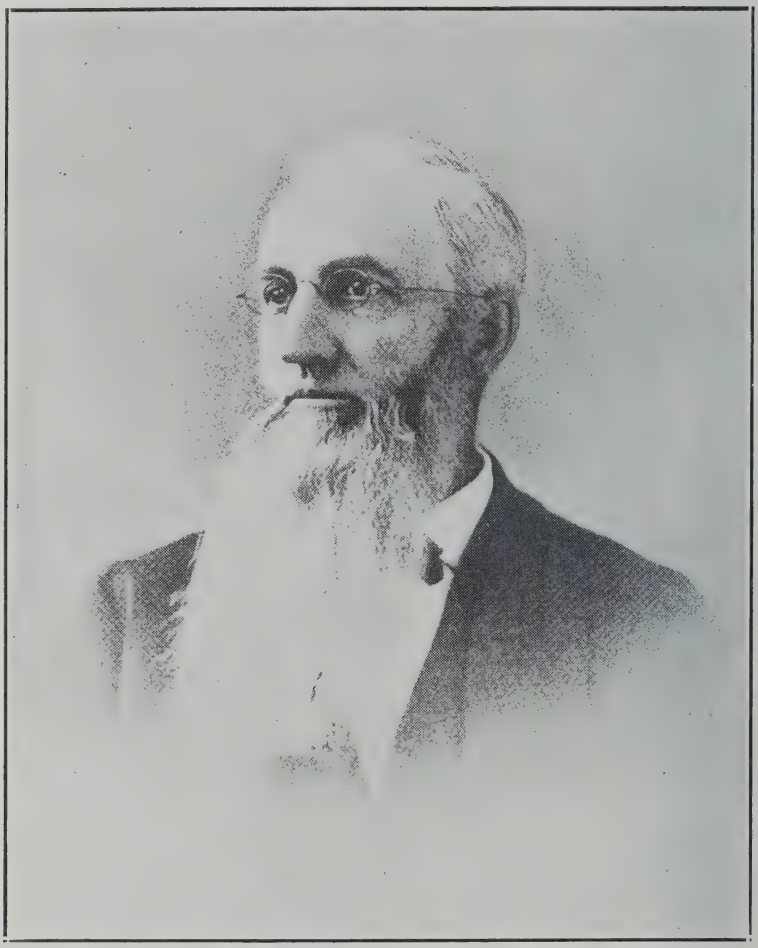
Nov. 23, put plants in press Almost clear, and cold. Put a rubber sponge in helmit for use against heat· Went to La Barranca by 9 a.m. and got down to and through the meadows on the south and got everything there, no ferns. One more day and I will be through. Weather fine but somewhat cloudy. Found an auto waiting for me at the top at 3.30 and now is waiting for more passengers. Less traffic today than usual. tFeel ired some.

Nov. 24, changed driers and went west to botanize but got little though I had a long walk till 5 p.m., got a fern new to me and a few others, and have cleaned up the region. Feel well still. It looked some like rain today and was quite cloudy in p. m. The ferns I got in a ditch 6 ft. deep and with vertical walls. Will go to the barranca tomorrow.

Nov. 25, put plants in press. It is nearly clear today, and cold.bar. normal. Got out to the barranca by 8·30 and went at once to the bottom at power plant and then south to where



JOHN TORLEY



SERENO WATSON

the trail comes nearest the river. and then back to the top by 1.30, and got a big and heavy load of stuff. It took me till 4.30 to get to the top and had to hurry some at that, was getting dark but I got home at 5. 0, and after dark, really 6.30 and feel some tired. No change in flora to speak of. Salix Bonplandiana was frequent on the levees and also a big leguminous tree in flower but could not get any. It must be over 3 miles to the top. Completed my work in the barranca and am well pleased at its thoroughness as to the seasonal flora. Had a fine visit with an engineer, a graduate from Cornell, who knew all the old time men there and who lost all his property in the Mex. revolution.

Nov. 26. they sell turnips here under the name of jicama. Went down to Colonias today and got some stuff in p. m. on the edge of town by the R. R. went down town to get some old papers for specimen sheets and got on the wrong car and landed at the market and had to take a cab home.

Nov. 27. I plan going to Empalme de Orendain on train. Yesterday I got Argemone Mexicana in flower with lemon-yellow bloom, 2-3 ft. high and apparently biennial: petals evanescent. Got Baccharis 4-6 ft. high. Nicotiana glauca is common and cult. The shiny-fruited Mimosa is a weak annual. Went to Orendain and got a pile of stuff. When night came I went down to Santa Cruz 3 miles to get a bite to eat and a place to sleep but was refused, but waited around till dark, and then it began to rain so I picked up my bundle and took the trail back, it was pitch-dark so that I had to feel my way along the path, and soon came to a big buttressed fig tree where I sat down between the hummocks to rest. Soon the wet invaded my pants and chilled me, then I had to get up and walk by feeling my way along back and forth in the rain till I was tired and had to sit down, and so I worked till dawn. I feared a grip infection might result but there was nothing else I could do but make the best out of a bad situation and get over to the Orendain switch and water tank with the hope of finding a Mexican there with food to sell, for usually they are on hand to sell eatables. So at dawn I posted over there in the wet and found nobody there, and so I hid my bundle of stuff and began to botanize near by when a woman came in with milk and cakes which I bought and ate. I had to wait till afternoon for train back but spent the time botanizing. All prairie here with 2 sp. of oaks scattered on the hills. The big-leaved one, a tree 20 ft. high and is round-topped has corky bark in vertical ridges, the other is a white oak and rarely if at all a tree Got some new Compositæ, one 4 ft. high with purple flowers. Yesterday 3 freights went south but so far today but 1 going north. Bar. is 4800 ft. alt, No cactus but a few Tunas. humidity of the Guadalajara region is 60-90 percent. This is a great place for the

natives to gather with eatables at train time. The maximum elevation on the way here was 5000 ft.

Nov. 29. Will dry plants and pack up preparatory to going home tomorrow. Yesterday was my last day of botanizing. I bought for my daughter, Mildred, a beautiful Mexican serape for 30 pesos. To the south of the track at Orendain is a section house, and here and there over the prairie is a conspicuous Cacalia, 3-5 ft. high, with the same kind of leaves as the one at La Barranca, but with big white flowers and is a very interesting plant, leaves erect like the compass plant. The formation seems to be an impalpable volcanic ash that slakes in water making it opalescent like glacial water. Saw the first Pteris aquilina on the steep slopes of the creek here, and in the bottom an Eryngium with broad and undissected leaves, in wet places is a Downingia. The dry prairie has tufts of a cyperaceous plant and 2-3 sp. of Cyperus. The grasses are Epicampes, Aristida, Muhlenbergia and Sporobolus, and in the wet places are paspaloids the mesa vegetation is rater scanty, indicating less moisture and poor soil. The usual Hyptis is frequent, and also some labiates, Tuna scarce, saw at Guadalajara some fields of wheat. The country has scattered volcanoes and big plains and low mts. covered scantily with liveoaks and long-leaved pines.

Nov. 30, 8 a. m. All set to go, packed up and ready. Been here 17 days. Gave the girl a peso for being so efficient while on the job of caring for room. weather clear and still. Got off all o k. after some rushing. Got a seat in the first class car with a Mexican afraid of propaganda. Time to go but nothing doing. We change time here from local to Pacific. Acatlan, a small town at left of a volcano. Much Agave cult. here. Now out of liveoaks at 4500 ft. high, now at 4000 ft. alt., Magdalena is next and 4500 ft. alt. in a great flat plain surrounded by low mts., all prairie and grass 2 ft. high, a beautiful region. 4.40 p. m. we just hit a cow and cut her all to pieces.

Dec 1, Mazatlan, got here at 7 a m. in the dark and went to hotel Del Mar and rested all day. Slept some last night on train Weather is lovely, sea a little rough.

Dec. 3, left Mazatlan at 5a. m. all set for Nogales and home, will soon be off, as we go most of the country looks wet and soggy beans 4 inches high, and plowing the fields is going on, here is a very rank castor field for we are near the sea, now a little cardon. Culiacan, big cottonwoods along a river, Populus dimorpha? Guachil, quite a town, mts 4-5 miles east.

Dec. 4, we are now north and east of Guaymas, had a good night's sleep, getting colder. Querobabi, everything dead and dry and it looks frosty, clear and cold, grass everywhere but all dead, lumber houses and looks more American, a great plain, much cattle. Got to Nogales at noon and through the custom houses

in an hour. Weather fair and still, everything frosted, left for Tucson at 4.40, with all baggage checked for Pomona, feel much relieved, nothing now to do but ride home, have had a sour stomach for several days, and got a package of soda for it and feel somewhat better now. They are plowing, and some wheat is up. Plenty of water here. Got to Tucson at 6 p. m.

Dec. 5, now at Banning, cold and still, did not sleep much last night and my stomach much upset as if I have an infection. It surely is good to be this near home.

Dec 6 got home duly, and was taken down at once with a very bad lumbago that made it very painful getting up and followed by ulcerated teeth and a temperature of 105°, so that I knew I had a serious infection which I began to control by medication. Then the teeth had to come out, and my doctor insisted on the hospital for me but I felt that although my blood pressure was 165 mm. I had the case under control. So next day my pressure was normal but the lumbago continued. Another doctor friend said I had rheumatism, so I began eating oranges and my trouble quit, but was Purgatory while it lasted.

After a few months of labeling I was at Berkeley consulting the Brandegee herbarium, for there was no one in California who was familiar with Mexican plants. Then I had another siege with lumbago and upset it with oranges. I doctored myself and family nearly always and never had any faith in the theory that bad teeth and rheumatism had any causative relation.

CACTACEÆ.

THE FANTASTIC CLAN.

A friend recently called my attention to a misstatement in this book (which I had not seen before) which has led me to go over it carefully and finding many errors that should not be permitted to go unchallenged. The authors assume an authority on pronunciation when the context shows no linguistic training.

The authors, Prof. Thornber and Mrs Bonker say on page 12 that "Near Victorville in southern California 'constellations' of huge masses of sahuaro (Cereus giganteus) are a sight never to be forgotten". Now what shall we say of this hyperbolic talk? The sahuaro does not form "huge masses" anywhere in California nor does it grow nearer than scattered along the banks of the Colorado and many miles from Victorville, the only noticeable things are

many miles from Victorville. The "Joshua",,Yucca, is the only plant growing in "huge masses" in California near there. Prof. Thornber knows better than to blunder like this and it is a good wager that he never saw the quotation in print before publication for it has the earmarks of feminine gush.

I am glad to note that they do not approve of the stupid Carnegiea of Britton and Rose, a name intended to flatter that old business pirate who paid the cost of publication and who did not think much of the proposed name.

I have often wondered how the sensible Rose came to do it.

The temptation to become a partner with a woman in a venture like this is great but a man gets the worst of it if he yields, for it is bad enough to have to face one's own blunders than those of others.

Their pronunciation is hopeless for it conforms neither to the English nor to the Continental method, both of which are found on pages 4-6 of Harkness's Latin grammar.

They give senilis as sen'-e-lis instead of se-ni"-lis, or sa-ne-lis by the Continetal; Johnsoni is given as John-son-e instead of John-son-i;they give aggregata as ah-gra-gah-tah instead of ag-gre ga-ta; Arizonica should not be Are-zo-ni-ca but Ar-i-zon-i-ca; They call Blakeana Blake ah na instead of Blake a na, their Cactaceæ should not be Kak ta ce e as it is in English but Kak tah-ka a, their Cereus is as it is in English but to be consistent they should call it ka ra oos. They mispronounce coccineus even in the English way for it is kok sin e us, but in the Continental is kok kin a oos; Covillei should be Ko vill i and not Ko vill e deserti should be de ser ti and not dez er te; Emoryi should not be Emor e but Em ory i; fulgida is given right in the English but the Continental which they ape would be fool ge dah; hystricina should not be his tre se nah but his tri si nah. They say in the text that macrospina means long-spined, but macros means thick; they do not give the proper name for the flat Opuntias which is Platyopuntia as given by Engelmann and not the illiterate Platopuntia of Britton and Rose. Wherever they use i in a Latin ending they make it ee after the Continental but are not consistent otherwise; they blunder on robustispina and say it is given as ro bus tis pena when it should be ro bus ti spi na; they give serpentinus as ser pen te noos when it should be ser pen ti nus; they call spinosior spin o si or when it should be spi no si or; they call viridescens vir i des ens instead of vir i des cens; they also blunder on Wislizeni, calling it Wis li zen e, when it should be Wis li ze ni. These errors are all from pp. 189-190. They do not give the habitat of all cacti mentioned, such as Cereus Johnsoni, from the Beaverdam mts. and Searchlight Nevada· The usefulness of the book is much impaired by the atrocious pronunciation.

In a savage review of this book "Desert" of the issue of Apr. 1932 page 130 makes a criticism that is unjust where it quotes the book's remark that some cactus will grow where the winter temperature is 25-30° below zero, calling it a gem of misinformation, but I have collected Cereus viridiflorus in Nebraska where the cold is 40° below and where Opuntia Missouriensis also grows. I have got Echinocactus Simpsoni, Opuntia fragilis, Mamillaria vivipara and Cereus phœniceus where the cold was nearly the same. My main fault found with the book is the unwarranted and unbalanced gush over this pestiferous family and the crude pronunciation. The illustrations are good and poorly colored. The printing and paper are fine.

CALIFORNIAN OPUNTIAE.

The name was proposed by Tournefort in his "Institutiones" for this exclusively American genus which was adopted by Linnæus in 1753. Britton and Rose in their N.A. Cactaceæ say that the name came from Opous where prickly plants grow. This guess is copied by the Oxford Dictionary, but there seems no foundation for it in fact. The name is from Opous a Greek town on the Eubœan gulf, and ontioi the present participle of eimi, the verb to be, meaning being in, dwellers in, or as we would say Opuntians and it was notorious that those people were traitors to the Greeks in the Persian wars, and so the name became synonymous with traitor, which fact Tournefort knew. What more appropriate name could be found for this viciously horrid genus?

Engelmann split the genus in two sections, Cylindropuntias and Platyopuntia. Why the hopeless splitters, Britton and Rose did not make two genera from it fully as good as their Cereus segregates is unanswered, but as it is the species fall into two groups, the flat and the round. Where the surface is plane no special term for it is used as in the flat species, but in the others the spine areas or areoles are arranged on interrupted ridges in eight rows, which are called tubercles, as in the cylindropuntias, but though the stems are round in O. leptocaulis there are no raised areas.

Key to Opuntia.

Cylindropuntia.
Stems like pipestems, ½ inch thick, erect.
Tubercles absent, fruit red and smooth. 1 leptocaulis
Tubercles pavement-like, fruit very spinose. 2 ramosissima
Stems an inch or more thick. Spines mostly sheathed.
Tubercles 4-angled, nearly square.
sheaths filiform, ½ mm wide. 3 Bigelovii

Tubercles longer than wide.
Tubercles 2-3 times as long as wide.
Stems erect, sheaths 2 mm, wide.
Branches clustered at ends of stems, joints not readily falling, fruit very spinose above and bare below and dry. 4 echinocarpa.
Branches not clustered above, racemose, joints readily falling and swollen in middle, flowers red and proliferous. 5 prolifera
Stems prostrate or arcuate below.
Stems elongated and prostrate, flowers greenish-yellow. 6 serpentina
Stems not over 6 inches long, arcuate, with tip erect, spines flattened and sheathless, flowers yellow. 7 clavata
Tubercles linear and elongated, at least 4 times as long as wide, fruit dry, stems erect.
Flowers reddish, fruit not biennial, very spinose 8 acanthocarpa.
Flowers yellow, fruit biennial, spinose around the upper margin. 9 Parryi
Platyopuntia.
Fruit dry.
Fruit about spineless, seeds large. 10 basilaris
Fruit spinose.
Areoles about ½ inch apart, spines hair-like. 11 ursina.
Areoles 2-3 inches apart, usually spineless below. 12 rhodantha
Fruit edible and juicy.
Stems with trunk, erect, very yellow spined, fruit purple, with green juice. 13 chlorotica
Stems prostrate or spreading widely.
Stems widely spreading, the base rarely erect. 14 occidentalis
Stems prostrate or nearly so and forming wide areas
Joints large, mostly obovate, spines declineb and white above 15 Mohavensis.
Joints relatively small, many in a string. 16 Vaseyi.

O. leptocaulis Eng. is an insignficant bush along the Colorado river where the red and globular fruit, often looking like swellings in the trunk when proliferous are noticeable.

O. ramosissima Eng. is an openly branched shrub, like the last and growing in the brush also but has very spiny fruit on the ends of twigs, but the vestiges of tubercles set together like pavement blocks.

O. Bigelovii Eng., the horrid cholla, pronounced choia, is abundant at about 1000 ft alt. from Whitewater to Arizona. The erect stems are stout and 4-8 ft. high and with clusters of short and thick branches which fall off when brushed by stock and also adhere to the legs the more they try to kick them off. The fruit is yellow and mostly insect-stung, seldom maturing, and then with few seeds in an acid cavity, seeds white, borderless, 3-5 mm. wide, 1.5 mm. thick, round, sharply apiculate at raphe. This has the same disarticulating habit as O. cholla, prolifera, and fulgida have and are shunned by all animals but the cactus wren and mockingbird thrush which nest in its branches. Fruit very spiny when young and becoming smooth in age.

O. echinocarpa Eng. This is erect and 2-3 ft. high, with fruit spiny around the top, and maturing the season of blooming and much eaten by chipmunks so that seeds are hard to find. It abounds with Bigelovii and east to Utah.

O. prolifera Eng. This seacoast cholla is erect and widely spreading with scattered branches, and fruit often producing buds which become floweres and these again proliferating into a string of flowers each one ready to form a plant but having an encysted seed in the aborted fruit. This is a pestiferous plant.

O. serpentina Eng. This rare coast cactus from San Diego is the only really prostrate species of the group and has very spiny fruit and red or reddish flowers.

O. clavata Eng. This is the only cylindropuntia without sheaths and the only one growing in dense patches with short and hooked stems decumbent and rooting below, flowers yellow, fruit 2 inches long, with white wool and many spicules. Seeds about 8 mm. wide. Abundant at Searchlight, and in the Mojave desert and eastward.

O. acanthocarpa Eng. & Big The fruit of this is spiny to the smooth stalk and boadly oblong. The branches are a foot or more long and greenish-brown, with the reddish flowers at the ends. It also is strictly Tropical in habit, as is Bigelovii.

O. Parryi Eng. This species abounds on the humid western slope and has yellow flowers and fruit smooth except for a few spines at very tip. The fruits are much eaten by insects so that good seed is hard to find but is like that of Bigelovii.

The flatstemmed, Platyopuntia, species are common on the foothill from 1000 ft. to 4000 ft. alt., though not restricted to it.

O. basilaris Eng. This is called the beaver-tailed cactus, and has the most beautiful purple flowers in the genus. It is Tropical and grows in the hot sands and is the only species with obovate-emarginate joints, 4-6 inches long, destitute of spines, bluish and with yellow areoles set in dimples on the surface, and rather close set, being about 7-8 mm. apart. The fruit is red, and dry and filled with the horizontally lying seeds, which are 8 mm. wide by 3.5 mm. thick, and with a thick corky and rounded rim 3 mm. thick.

O. basilaris var. Treleasei (Coulter). This variety is like the type in spreading decumbent over the ground, but has raised areoles and 1-3 short spines in them. Bakersfield.

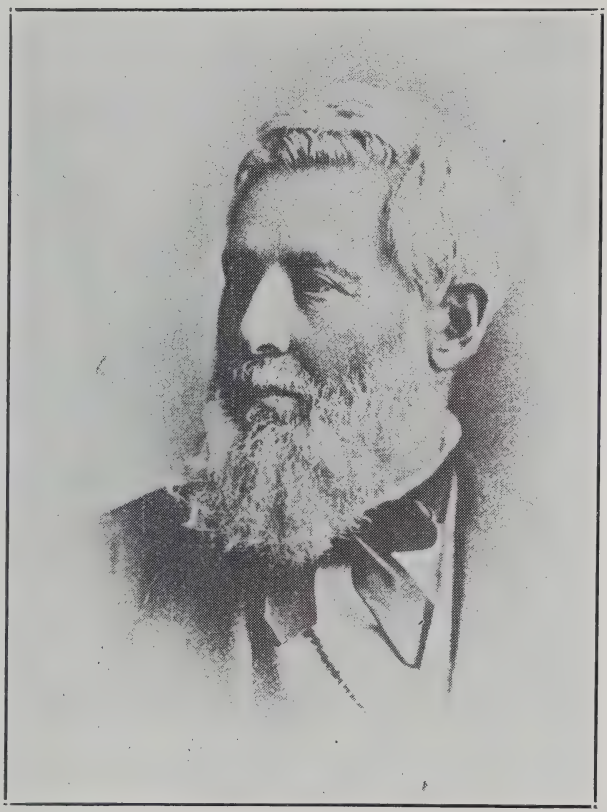
O. ursina Weber. This has areoles half an inch apart and usually with long and hairlike spines. When the spines are half an inch long it becomes O. erinacea Eng. The fruit is very spiny.

O. rhodantha Schuman is the only dry-fruited one left. It grows high up in the Middle Temperate or Pinus ponderosa area of the White mts. The areoles are 2-3 inches apart and is red flowered. It forms clumps, being decumbent, and has small seeds. There is much doubt about the validity of this and rest of the species.

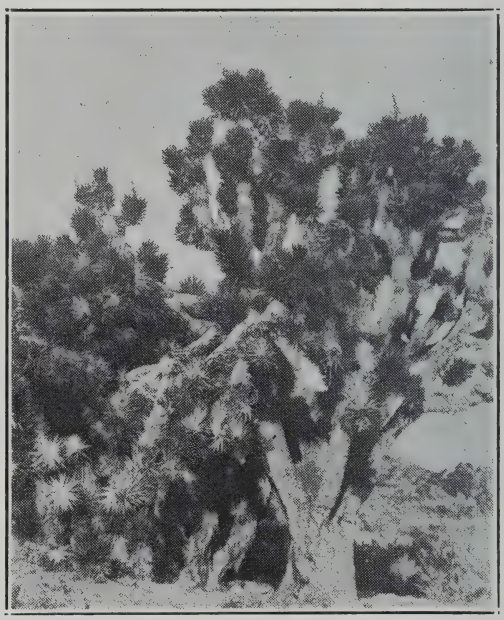
There are two cult species having erect and tree-like trunks, that grow with us, O. megacantha Salm Dyck which has truncate fruit and large and mostly spineless joints; and O, Ficus-Indica a narrow-stemmed cactus with deeply umbilicate fruit are cultivated largely as spineless cacti, having been exploited as such by Burbank.

O chlorotica Eng. & Big. is the only species left that is erect. The whole plant is kahki-colored, withthe very bristly bronze areoles and fruits with green juice. The joints are about round and half a foot long. This grows on rocky slopes near the Colorado.

O. occidentalis Eng. & Big. probably includes the following two species since there are no sure distinctions obtainable. The seed character has 3 sharp angles on the outer rim of the circular seed to which the juicy purple pulp clings, and the fruits vary from oval to oblanceolate, and from truncate to deeply umbilicate. The joints, or sections of stems, normally vary from round to elliptical or oblanceolate and run from half to a quarter inch thick, the spines are one to few and declined in the axils, variously angled, and red, black or brown below. The thin form of this species. O. Covillei Br. & R. also has yellow flowers and is common on the foothills, passing readily into the thick-stemmed var. littoralis (Eng) Parish, most common along the coast. The species has ascending to prostrate branches, often a foot long from very spiny stems which are erect. The seeds are flattened, 2 mm thick by 2.5 mm wide, with a rim .5 mm wide. O. Mohavensis Eng. is a nearly prostrate plant of the juniper belt, with large joints, and goes from San Felipe valley to 6000 ft. alt. in the higher mts. O. Vaseyi Br. & R, is another form of occidentalis with thin parts and small, reddish joints prostrate, and often purple flowers. It is common in the foothills.



ASA GRAY



YUCCA BREVIFOLIA VAR, WOLFEI

The color of flowers and juiciness of fruit are not reliable in describing species, nor is the shape of branches and number of spines and their color ,of value, but the distance of areoles apart is significant.

On March 3-4 in a trip to study cactus I found none to speak of till 30 miles east of Barstow where some O. echinocarpa and fasciculata came in over a small area and disappeared till 11 miles from Baker where they came in strong in a wash and prevailed to Mountain Pass and Yucca Grove where was very much Cylindropuntia wherever the yucca grew, elevation 3500-4000 ft. alt. The flat Opuntias came in at the pass, such as basilaris and much rhodantha with 6-10 reddening joints. Above Wheaton spring was some chlorotica, 3-4 ft. high, on rocky slopes, also Mamillaria deserti.

Yucca brevifolia var. Wolfei n. var.

At Yucca Grove and Mountain Pass on the Arrowhead highway are immense numbers of a yucca having small and oblong-ovate heads about 6 inches by a foot long, of flowers, which are sessile at the ends of the branches, the white flowers are 2 inches long, with the linear-lanceolate petals 2 mm. thick; stamens with globose anthers; odor carrion-like; leaves 4-6 inches long and very sharp-edged and short-pointed with a black spine. The stems are more slender than the type and have many more slender branches and with trunks rarely 3 ft. through. Named for Mr. Wolfe of the Santa Ana ranch who first noted it.

Hutchinsonia hyalina Jones proves to be a rayless form of Hymenothrix Wislizeni which Blake has mistakenly named H. Morrisii.

DICORIA T. & G.

This genus was first proposed by Torrey in Emory's Rep. as Dicoris on page 143 where it would be given later in the report, but never was, though it was fully given in the Mex. Bound. on page 87 as Dicoria where it was quoted as having been published. This deliberate error reappeared in the Synoptical Flora. It was said to have been discovered growing on the drifting sands (sand dunes) west of the Colorado " in Arizona" (California), "not since found" where it abounds today. The change of name was Gray's work, no doubt, for Torrey did not know Latin nor Greek, while Gray claimed to know both, but in fact was ignorant of Greek as shown by not knowing the genera of Cotyledon, Mecon and Erigeron. Gray was a great stickler for linguistic proprieties, but was always floundering himself, even in this case it would have been better to leave the original name unchanged or to have called it it dyschoris, false bug, which would have been better Greek, than to use a corrupt and an unclassical spelling for choris, bug. They state that the bracts are accrescent, a fact unknown to recent botanists, or ignored by them, and they draw them as plane, and give an erroneous impression of the facts. The stamens are not

drawn as they are in nature but the anthers are spread out as they become after anthesis, but in flower the tips cohere and the body of each bulges out, forming with the rest an oval mass till they discharge. The filament tube is a simple hyaline, 5-toothed corolla-like cylinder within the main obconic and stipitate corolla of the staminate flower. The fertile flowers are 3 and corolla absent, consisting of a naked ovary with the 2 linear stigmas, subtended by a floating and accrescent glutinous bract which is deciduous and carries the seed away with it. These 3 bracts are inconspicuous and small at first, the outer one appearing as a mere appressed scale, but beneath it is the first ovary which early becomes a seed and protrudes some till its bract developes and embraces it. At first the bracts are flat, oval and small, but in a few weeks become boat-shaped by the incurving edges and an inch long as in my specimens of Brandegei. The type of the genus was collected very late in the year, after frost, and this is why the floating bracts are so well developed. The type of Brandegei was got early in the fall before the last two bracts had emerged. The genus is annual, with the habit of Ambrosia and Franseria, and the rough pubescence,the outer bracts are explanate when mature, and oblong-linear and rather truncate at tip and 4-6 in number. Then come the 3 bracts with the fertile flowers, on the receptacle, and then the cluster of sterile flowers with the yellow anther ball. Ignorance of the late blooming was the cause of the remark of T. & G. " not since found", and of my failing to get it for 40 years, and of the blunders of Miss Eastwood, Kearney, and Blake in making synonyms. There are but 2 valid species, Brandegei and canescens, based on the leaves, narrow and broad. The mature plants are widely panicled like tumble weeds, but the floating bracts blow off before the roots loosen. The cotyledonal leaves of Brandegei are 4-6 inches long and acuminate.

About 20 years ago I was out on the Green River desert, Utah studying radium deposits, with my friend Robert Woodruff, now dead, and had just rescued him from dying of thirst when we came to a large patch of Dicoria, the first I ever saw, in October. The purple-spotted bracts reminded me of Astragalus pictus. so I sprang out of the wagon to look at it and began to shout "Eureka" and went wild saying "I have found the plant I have been hunting for 40 years". I knew it instantly and gathered it. No plants could be expected alive at that season. This explained my finding the cotyledonal leaves at Moab earlier, and led me to theorize about missing it before.

On Oct.1 st. 1933 I went to Mt. Pisgah an extinct volcano in the Mojave region near Ludlow, and found near Dodge station 10 miles east of Barstow large numbers of Dicoria in full bloom along the way, and none had a suspicion of an enlarged bract, and I got specimens of it. There were ripe single seeds in each flowerhead.

On Oct 22nd. I took another trip to the same place and found the plants in full fruit, and all of them full of ripe fruit and with the enlarged bracts concave and boat-shaped, and mostly half an inch long, and covered by stalked glands exuding a gummy and bitter substance. Most of the heads had 2 opposed bracts making a seeming laterally compressed and ovate bloom with each bract so concave as to loosely enfold an akene. The stigmas were 2, or split to the base and deciduous. Occasionally there is a long-stalked stigma below the group of sterile flowers as if another akene were about to develop, the staminte ones were always present. The akenes were quite concave and with incurved edges and with the center of the convex back full of stalked glands though the rest of the truncate akene was smooth and shining.

A few days after this I also went to Whitewater to study the genus there, but found none in bloom because the season there is a month later though the elevation is the same. Miss Eastwood was the first of the natural blunders to make fake species on the relative size of the bracts in D. Wetherilli and paniculata, forms of Brandegei; then Kennedy with D. Clarkæ from canescens; then Blake in Tidestrom's flora of Utah and Nevada copies them.

Oct. 28th. I went toward Whitewater, and below Cabazon on the way found all the plants in bloom and with no sign of an enlarged bract on any, and most of them with one mature seed to a head, which had no corolla. The unopened anthers made a yellow ball till they discharged, then they gave way at tip and flared because the edges are free. The type of Brandegei is young and immature and so has no enlarged bracts which Kennedy (not Kearney) gave to D. Clarkæ. It is now an established fact that the bracts develop very late consecutively.

Nov. 7th. I revisited Cabazon and found the plants with 2 3 floating bracts developed into hemispherical boat-shaped ones, about ¼ inch long, but when I went on down to Palm Springs at sea level Dicoria was only just in bloom.

Dec. 29th. I was again at the Springs and found the plants all in full fruif and normally 3-4 ft high and paniculate but some stunted ones only 4-6 inches high.

Jan. 3rd. Went to the Springs again and east to Kane spr. and found Dicoria here and there fully developed in fruit and 3-4 ft. high with the habit of tumble-weeds, but the bracts deciduous Had Gray known that there are 2 opposed bracts he might have called the genus Didymocoris, a better name.

Hutchinsonia hyalina Jones (See above) is a rayless form of Hymenothrix Wislizeni Gray which Blake has mistakenly named H. Morrissii, it is not often that one can correct two blunders at once but his species cannot be maintained in the face of integrades I am indirectly indebted to him for the correction.

Allium crispum Greene Pitt. 1 160. This good species of the erratic Greene is put by Jepson as a var. of peninsulare, but no intergrades appear over a wide field. Greene was so addicted to seeing characters that had no existence, that his descriptions did not pass muster with acute botanists, but in this case he was right That the inner perianth of Allium is hyaline-margined is not known in native onions. In this case the segments have a thin edge 1 mm. wide which is so fluted as to seem beaded to the eye, but is white and crimped, but on drying seems lacerate. The bulbs propagate by division and are quite small and deep seated in the spongy gumbo soil which bakes hard in summer. A. dichlamydium, its ally is misspelled by Greene and by Jepson. Its segments are oval to oblong and acute, not acuminate, and without serration. Botanists will not soon forget Greene's eruption with new names for genera and species following the advent of the Kew Index, as though he had just come to that subject in his botanical studies. He was imitated by E. P. Sheldon on Astragalus where he made a new name for A. pictus Gray because antedated by a nomen nudum. Greene then switched to Dioscorides to exhibit his great Greek scholarship, using a recent translation of the old pharmacist's work. This bluff got by because Greek was not known to many or so poorly known, about as well as by Cope and O. D. Marsh, the zoological scourges.

ARCTOMECON CALIFORNICA.

In his Death Valley report Coville copies Watson's, Gray's, and Torrey's blunder on the gender of Arctomecon where they took it to be neuter because it ended in "on" the usual ending, but omego nu is not neuter for it is the ending of mecon.

There is in Utah and Nevada a large area of Jurassic or Tertiary clays representing ancient salt seas where alkaline clays are exposed which are so barren that litle vegetation will grow on them and here is where Arctomecon Californica abounds in Nevada No one has ever succeeded in growing it.

Psoralea hypogæa Nutt. is described as having linear leaflets, but they vary to oblanceolate.

Astragalus Brazoensis Buckley was one of my pleasant surprises in my Texan botanizing, for it grew abundantly from Eagle Pass to Uvalde by the roadside along with A. leptocarpus and Nuttallianus on the plains. The species I cannot describe better than was done in my monograph, and little can be added except that it is a smooth and prostrate annual in the open and straggling upward with other vegetation. The remarkable pods one never forgets, differentiated, reminding one of Medicago, Mimosa and Pithecollobium, and other aberrant legumes, in its strangeness. The ripe pods are mostly very flat so as to be linear in cross-section when mature, and arcuate longitudinally, with raised meshes on the angles, and the pod jointed to the calyx and opening along the ventral suture but not explanate. It is a good sheep forage but does not grow out of the Tropical lifezone.

Astragalus leptocarpus T. & G. is hard to distinguish from A. Nuttallianus in the field where they are found together. Normally it is erect from a decumbent base, a foot or so high, with the blue flowers capitate or in short spikes and twice as large as the other and the pods twice as long and wide, and smooth and not so sharply kinked near the middle. Plant normally quite smooth throught. A good sheep feed. Tropical though going a little up on the Edwards plateau.

Eriogonum trichopes Torrey. Gray was the one who altered this to trichopodum because it was a hybrid name. Had he been half as familiar with linguistics as he assumed he would have seen that the Romans were chronic violators of this rule themselves and did not lay much stress on it. Had Torrey called it trichopus there could have been little to citicize.

In a recent trip to Julian Cal., an old station on the historic trail of the padres, and the one followed by Bigelow in the Mexican Boundary survey when Artragalus oocarpus was fiirst found and later on figured as crotalarioide by Torrey, I found this rare species growing by the old trail in the timber where Mrs. Brandegee rediscovered it some years ago. It grows in erect tufts there 3-4 ft high, but straggles over bushes in the shade.

Pyrola L. is messpelled Pirola by Jepson Man· p. 638 and by Torre and Harms Siphonegamia, but other authors give it as in the Species Plantarum. Bailey gives it right, but gives the derivation as a diminu tive of Pyrus. Pyrus is the Greek puros name for various kinds of grain because of the ripe color, red from pur, meaning red. It is more likely that the name was used because of the color of the flowers than any resemblance to pears. Bauhin first used the name which Linnæus adopted.

Crossosoma Bigelovii Watson. In his type description Watson says that the embryonic character disagrees with the Pæonieæ but in the field a person is struck by the similarity of the genera though Pæonia is an herb. I was glad to see that someone had courage to create the Crossomataceæ.

Argemone purpurea Rose is another of Rose's foolish species for anyone collecting along the Uvalde-Eagle Pass road passes past acres of hispida and then comes to purpled or tinged forms and then to all-colored ones and soon out of them again into the normal ones, some are almost black, then a few rods away are lighter-colored forms, one is led to think it a good species because the genus has none but yellow variants elsewhere. There is no other character but floral color to the species proposed by Rose and so it falls. This surprized me more to find it than I was to get white flowered Eschscholtzias at Cochise Ariz. growing wild, for I had seen white and pink ones in cultivation.

Defending Ones Self.

In writing on pages 3-5 Cont 17 I was writing of a historical fact as a matter of news, not knowing that it had become publicly distorted by Jepson to feed a grudge at being exposed as an ignoramus. It was not written as an apology and no attempt was made to soften down the event for I never felt any regret at my part in it, and I would do the same thing now. A man who will not fight for his rights is a fool. In my younger days I used to believe implicitly in the hairbrained doctrine of nonresistence to evil and other fool teachings of the Christian church such as divorce, but my experience in life has taught me that there are ones who will rob you because you are a pacificist, and others will skin you in the sacred name of love, and so the only way to secure the right is to fight for it. In Mexico they carry arms for protection. Once two men put up a job on me and tried to sneak up on me, but desisted when they saw I was ready for them. Pringle was a Quaker and lived his religion and suffered for it as a slacker in the great Rebellion, but I have long since discarded that hairbrained theory of Christ along with his other religious "revelations". We have crooked lawyers and judges who insist on obedience even to unjust laws, I do not when I know they were enacted by corporate tools for selfish reasons. When I was called for jury service in Salt Lake once I was asked if I would swear to bring in a verdict according to the law and the evidence. My reply was "No". When asked my reason for it I replied that I would swear to see that justice was done but I would not bind myself in advance to observe any fool law that might be in the statutes, and that the wrong side to a case usually presents perjured evidence. I was excused from service.

Streptanthus carinatus Wright and S. Arizonicus Watson cannot both be kept up and it is unlikely that platycarpus is separate. The degree of saccation at the base of flowers is variable. The petal blades are oblanceolate and conspicuously purple-veined, and with rather wide and hyaline margins as far as base of claws. The more robust specimens have the lower leaves conspicuously

lyrate-lobed, but smaller plants have all leaves entire. Entire-leaved ones fit Arizonicus well, from Stein s Ariz., my no. 28070 Forms that fit carinatus well are from Kent Texas my no. 28059 and Campbell's ranch, Azucar mts. Ariz , near San Simon, my no. 28071, but among them are forms that go as well as Arizonicus. The blades are very variable in width. If the species merge platycarpus takes the name. It is evident that some Streptanthi must go into Caulanthus.

FINANCE

People often write Pomona College for my Contributions as if it were my botanical legatee when it bought my herbarium, but it has no interest in my library or publications nor control over them, nor would it be tolerated if attempted. Since 1923 all material collected by me has been mounted or used as its own, but not under any agreement with me. The types of my 1926, 1928, 1930 and 1931 collections went to the College by agreement because it helped finance the trips, but since 1931 it has had no financial interest in my work. With these exceptions I have had no official connection. My publications are my own and written to state my opinions on modern day botany, in spite of unasked advice of timid people, and at my own expense. I do not advertise nor sell to dealers, nor ask them to be reviewed because our magazines are in the control of propagandists who cannot be trusted to be fair or honestly review a publication which does not follow their code.

NORTHAMERICAN BOTANY.

Early in the 19th century and the last year of 1700 Humbo'dt with a great retinue of servants began exploring the flora of Mexico and in 1814 began publishing his "Nov. Gen. et Sp." in varied volumes, and laid the foundation for climatic and ecological research and developed knowledge of isotherms, laying down the limits of climatic areas in zones. This information was generally accepted by the world as correct. He divided the world climates into Tropical, Temperate and Arctic or Alpine, supposing them to be limited by the latitudes which he thought controlled continental isotherms. He published a diagram of the floral zones of Mexican volcanoes which was copied in Cornell's geography in my boyhood days and which I studied.

In the latter part of 1700 much botanical work was done by Muhlenberg, Marshall, Bartram, Elliott, Gronovius, Clayton, Bradbury, Lambert, Pallas, Plukenet, Catesby, Menzies, Nuttall and others either as collectors or authors till Michaux got out his flora of North America which in 1814 was followed by that of Pursh and Nuttall's Genera in 1818.

At this point on June 3, 1934, my father, Prof. Marcus E. Jones met with a fatal accident. He was returning alone from a day's field trip in the San Bernardino Mts. enjoyed in company with the Samuel B. Parish Botanical Society when, at an intersection in San Bernardino, his car was struck in the rear by another car and overturned. He was thrown out, suffering a basal fracture and other injuries, and instantly killed. He died as he had wished, "in the harness". In his home, or workshop, where he lived alone, were found his printing press, fonts of type, the completed pages of this "Contribution" and a binder of various manuscripts, most of which he must have intended to work over and print; for he planned 100 pages more. I have done my best to arrange the material, condensing as necessary. His recent notes on Opuntia can be found in "Desert", a magazine on succulents published in Pasadena. He probably intended to include his list of plants collected on a recent trip through Mendocino county and into Oregon, but it is impossible for me to include it. The rather long manuscript has been left at the herbarium of Pomona College with Dr. Munz, where it can be consulted by anyone interested. There also can be found his many books of manuscript of his unfinished "Flora of the Great Basin."

In these pages I have not tried to delete all of his caustic comments (although not assuming responsibility for them). I did not like to destroy so characteristic a flavor, which many of his correspondents evidently enjoyed; else why did they ask for more ? Those who knew him well, knew that his "bark was worse than his bite", that he would go to unlimited lengths of unselfish kindness to help or accomodate a fellow nature lover or scientist; but his own pride together with his hatred of sham, pretense, self-seeking, or domination sharpened the barbs of his criticism and sometimes affected his judgment. Perhaps some allowance or forgiveness may be granted him in appreciation of his remarkably keen mind, enormous fund of information, great versatility, his more than 50 years of wide and varied field experience and painstaking investigation, and his amazing vitality and determination, which made him continue his field trips and even the printing of his own books after the age of 82.

Mabel Jones Broaddus

(continuing NORTH AMERICAN BOTANY. See also Cont. 15:74; 12:82; 3:78).

About the time Pursh's Flora came out, there came to America a talented Frenchman by the name of Rafinesque, — a man with an exalted opinion of his own importance, who became the pest of American botany. He was three years older than Nuttall who was born in 1786. Nuttall was a high-strung Englishman, who became curator of the Har-

vard Botanical Garden and later on an instructor there. Rafinesque published his ideas in Silliman's Journal for years, till he wore out his welcome and began to publish himself the American Monthly Magazine and Neogemyton, etc., where he had no one to restrain him.

John Torrey, twelve years younger than Nuttall and a genial gentleman who had no enemies and many friends, was made professor of botany and chemistry at West Point and soon became the semi-official government botanist. After Lewis and Clark's Expedition to the Northwest, he took up the work of naming the collections of government expeditions.

Nuttall, who had named specimens collected by Wyeth, was eager to get into the great West, especially after meeting Wyeth and hearing him tell of his explorations. In 1833 he applied to the directors of the Harvard gardens for leave of absence to go on a trip with Wyeth, but was refused. This attempt to dictate to him so aroused his anger, that he promptly resigned and arranged with Townsend, a geologist, to go with Wyeth and explore. They outfitted at Independence, Mo. or Leavenworth, Kan., nearby, and started out afoot, carrying their packs on their backs.

Just what was Nuttall's equipment on that trip is unknown, but it must have been poor; for all of his specimens seen by me were mere snips such as a school-girl would take on a ride into the country and preserved in the same way, by being put into a book and left to blacken. After meeting Wyeth's party at Boneville, no doubt he was allowed to carry his luggage in the mess wagon, but his space was surely limited.

The trip began April 28, 1834, too early, Nuttall complained, for botanizing along the way until they got about to Independence Rock in Wyoming. From there on he was able to get specimens of the flora, particularly along the Green River west of the present town of Green River, at Granger on Ham's Fork, at what became Fort Bridger, and along the Bear River to the Pierre Meadows (now Soda Springs), where they feasted their animals on the rich grass. Then the road crossed a low range, down along the Portneuf River to what is now Pocatello, and down further to Fort Hall on the Snake River. There some of the party revolted and built the new Fort Hall 29 miles up on the Portneuf. There was a ford on the Snake River here which they used, going up Lost River and over the range to the Salmon River, which they followed down a way before going over to the Snake again below what is now Boise. Then they followed the Snake down near to the present Huntington, where they ferried across the river and went up the creek above Huntington to the divide leading down to what is now Baker City, where there were fine meadows for their stock. They continued down the meadows to what is now La Grande and there they went over a high range to avoid the box canyon leading down the river to what is now Umatilla. Here they reached the Oregon or Columbia River and followed it to Walla Walla, their destination. There the party broke up and Nut-

tall went down the river to Astoria. From here he sailed for California, finally reaching San Diego, where he remained for some time botanizing. He then went by boat to the Sandwich Islands and back to the Atlantic coast by way of Panama. This monumental trip was the most productive of new species and new genera of any of the transcontinental trips, and yet it did not cover more than one fourth as much territory as I have covered in my botanizing. But it was made by slow wagon travel, while I have traveled over Nuttall's route several times by auto or train through Wyoming and west, botanizing at critical places on the way, and visiting many of Nuttall's type places.

After this time the Government sent out many exploring parties equipped for botanical work. Gray, who was a pupil of Torrey's in the early days, naturally shared with Torrey the naming of the botanical material. Together they got out also the Report on the Mexican Boundary Survey.

When Nuttall returned from the west with all his collections, he deposited his types in the herbarium of the Philadelphia Academy of Science and was elected a member of the Academy and a fellow of the Philadelphia Society. He continued his relations with that body until his death. It is evident that he had some plans about getting out a flora of the United States, for in 1818 he published his Genera of North America, and in 1842 his Trees of North America. Just what was the cause of his hostility to Gray is not known, but professional jealousy was not unknown in those days when Rafinesque was making himself odious by his publications. The fact remains that Nuttall did not at all like Torrey and Gray's handling of his new species and genera in their Flora of North America. That Nuttall regarded Gray as an upstart was evident, for Gray was 24 years younger than he. Yet so far as I can find out Gray never entered into any controversy with Nuttall, but only with men who were younger than he. Gray was a savage partisan and did not hesitate to try to crush them.

In his later years Torrey deposited all his types in the herbarium at Columbia, which school was to become his botanical executor. The small fry who followed him frittered away their time in institutional jealousy against Harvard, being too cowardly to defy Gray, who had become a botanical dictator, looked up to by us younger men as the only authority in American Botany. We sent him all our specimens for identification until we began to see that his judgment of species was often erroneous, and began to publish names of our own for plants that we had collected. This caused his hostility and resulted in his trying to suppress us by shutting off our avenues of publication. While Gray lived, most of those who disagreed with him, kept a discreet silence. The two leading objectors were E. L. Greene and I. I ceased publication until after the death of Gray, but Greene, who became rampantly hostile and vowed he would devote the rest of his life to undoing the work of Gray, continued to publish in the California Academy of Science Proceedings and

later got out Flora Franciscana and Pittonia, a series of publications, followed by Leaflets, and other issues. He got Jepson to start Erythea, a Calif. Journal which held on for some years till it finally died from lack of support. Then Jepson started Madrona, a similar publication, which had a precarious life. Greene went insane before he died. Gray finally died of old age. His work was continued by Watson, his chief aide, and by B. L. Robinson, his successor at Harvard.

Very soon after Gray's death, N. L. Britton of Columbia began trying to dominate American botany. He enlisted the services of J. N. Rose of the National Herbarium, and between them they got out a revision of the Crassulaceae and Cactaceae at Britton's expense. Not long afterward Rose died.

Britton had started the New York Botanical Garden, from which he published Memoirs at various times, and at last began the publication of a flora of North America, enlisting the efforts of P. A. Rydberg, Curator of the herbarium, until Rydberg's death. Britton has certain peculiar ideas about species and genera that are not favored in America, and he has not ceased to try to throw discredit on the work of Harvard and of others who oppose him.

(This article was obviously left unfinished. M. J. B.)

NEW SPECIES

Nissoloides cylindrica (3784) *N. Gen and N. Sp. No.* 27223. Guadalajara, Mex. Nov. 27, 1930. In moist fields, creeping and rooting, with the habit of Desmodium. Stems filiform, 2-4 ft. long, with long internodes. Stipules green, rigid, nerved, acerose, 2-4 mm. long. Leaves small, 1-2 in. long, of three leaflets which are elliptical, 1-1.5 cm. long, thin, venose, rounded at both ends, entire and without stipules, puberulent, on a rachis about as long as the leaflet, the terminal leaflet about 2-3 mm. from the pair, darker above and veiny. Flowers in slender axillary racemes six inches long, and in fruit separated by about 1 cm. and subtended by triangular bracts 1-2 mm. long. Pedicels reflexed in fruit and 6 mm. long. Calyx about 1 mm. long, triangular in longitudinal section and with the triangular lobes as long as tube. Flowers apparently very small. Fruit filiform, 1-2 in. long, of six joints almost cylindrical but a little constricted at the joints, very slightly flattened laterally, longitudinally striate and very shortly crisp-hairy; each joint about 4 mm. long by 1 mm. thick, with rather prominent but not winged sutures, all alike; no wing on the terminal one but it is acuminate, shortly stipitate. Flowers absent.

NOTES AND REVIEWS

Filix Adanson Fam. This genus not having any species appended to it by Adanson, must stand on the first description of it by others where species were given with it. This would be that of Gilib. Exerc. 1792 where he describes Athyrium filix-foemina. This then becomes

the type of filix. So the contest is between filix and Athyrium as to priority and not with Cystopteris. Therefore Maxon's and Underwood's references of Cystopteris to Felix are unwarranted.

Nothoscordum striatum. This plant has much the same habit as Allium and the markings of the bulb are about as in A. Bolanderi or hyalinum. The bulbs when mature are about an inch long, ovate, and with the thin coats of the onions. At the junction of the base of bulb to the roots, bulblets are produced outside of the coats, are ascending and sharp-pointed, several of them to a bulb, and white.

Androstephium violaceum Torr. This has the same kind of propagation as Nothoscordum, but the bulb coats are thick and very fibrous with many vertical ribs.

In Coulter's Flora of Texas he left out the genera Cooperia, Crinus, and Zephyranthes on page 430. But he put them in the key on page 429.

Amsonia by Woodson. In this recent brochure things have been brought up to date and the species revised, but in my opinion, too many species have been recognized in the genus. There are in all probability few genera younger than Amsonia, and the so-called species are too confluent for good species, but the collections are as yet too meager for certainty in defining the proper limitations. I am sure that Amsonia brevifolia and tomentosa are only forms of the same species. The characters given by Woodson do not hold out. I have seen acres of them and studied them in the field fully.

The geological maps accompanying the brochure are open to serious criticism. Mr. Woodson does not pretend that the maps are his own, but says they are copied from sources which he considered authentic; my criticism is therefore not aimed at Woodson but at the author of the maps, who is unknown to me.

Any attempt to account for the origin of species geologically must as a basic fact have accurate information on the geology involved.

I have been an active field geologist for fifty years and have traversed most of the regions involved and studied them in detail, besides being familiar with the explorations and reports of Government geologists of the 40th parallel, the Grand Canyon of the Colorado, Wheeler's and Hayden's reports, and the geology of the Henry mountains. I have also been personally acquainted with the men, Emmons, Dutton, and Gilbert who did most of the work. I say without any reservation that the outlines of the continent in Cretaceous times as published by Woodson are wrong, no such areas ever having existed above the ocean level in those times. Later on I will take up this matter in detail.

It is natural to want to find the origin of species during geological time, but up to the present there is too little authentic material on which to work, and in addition, the paleobotanists who have described most of the species are not competent systematists, and their results are mostly

guesswork rather than established facts. I have had a chance to check up on the work of Knowlton and Ward on certain geological formations. Take, for example, Knowlton's work on the Tertiary flora of the upper Snake region. There are certain regions of exposures in which fine leaf impressions are to be found. Knowlton figured and described certain genera as Populus, Salix, etc., making numerous species based on those impressions. Now what competent botanist would dare to identify any species of Populus on the leaves alone, knowing the species as they grow all around him ? And yet here is a paleobotanist who does not hesitate to name a species from the leaves alone. I seriously doubt if he even knew what were Populus and what were Salix species. No field botanist of today could identify certain leaves which I might furnish from Populus angustifolia and Populus dinorpha and tell even the genus to which they belong. When a person does not know the facts on which geological papers are based, he is inclined to marvel at the acumen of the botanist who did the work, but when he knows the facts he feels that the man is a grandstander and nothing more. In this cluttered up condition of paleobotany where will a man land who tries to find the origin of species of plants in geological time ? It is a wild-goose chase.

In my work on Astragalus I made a serious effort to get at the origin of the genus in geological time. I found nothing worth considering prior to the Quaternary, glacial period.

Cactacae by Fosberg (Bulletin So. Cal. Acid. Sci. Vol. 39, Pt. 2) In his article Ray Fosberg makes a number of new genera out of various Cactaceae published in Britton and Rose's Cactaceae. That publication was a fiasco which has made the authors justly odious. It is a pity that Fosberg does not know more about generic limitations. What the Cactaceae need is not expansion but drastic contraction, and nothing but that kind of treatment will ever go with western botanists. A person who tackles Cactaceae at once invites contrast with the magnificent work on the family by Engelmann, the greatest of American botanists, and he must be a very great person to appear anything but a pygmy in contrast. It is not a question of getting into print with one's own ideas. Anyone can do that. Are his ideas worth printing is the question.

The author's Latin is rather raw, and his familiarity with Greek is nil, but he does not hesitate to coin a lot of Greek names as though he knew what they mean and what they are. This shows the foolishness of insisting that all new descriptions be in Latin.

Umbelliferae by Miss Mildred Mathias. I confess in looking over this very elaborate and exhaustive work by Miss Mathias that I do not like it. I would like to go through it critically and show up all its shortcomings, but personal reasons prevent. I must content myself with saying that she seems to have no sense of generic proportion, but follows, in the main, the meanderings of Rose in his treatment of the Umbelliferae, and

in keeping up on trivial grounds various genera that never had any standing. The author probably never had much field experience, but bases the work on herbarium material. A very small amount of field work would show her the absolute untenability of many genera, if she has any generic sense of proportion. Her sense of specific limitations is also weak, since she keeps up as species many varieties that any field botanist would recognize at once.

Since there has been such widespread opposition to Rose's treatment of the Umbelliferae, one expects a philosophical discussion of the basis of every genus; but Miss Mathias seems too timid to attempt it. I am amazed at her identification of Cymopterus lapidosus with C. longipes. It is quite a different thing, more like Cogswellia. C. longipes is a peculiar species, growing flat on the ground in early spring with a rosette of leaves and sessile inflorescence. As it matures the foot elongates and the pedicle also so that the flowers or fruit are a foot above ground. The root is tuberous and fleshy, while that of Lapidosus is quite different. So is the habit of the two. I notice a similar absence of critical judgment in C. Fendleri and Newberryi. I discussed them in one of my early papers (Cont. 4), showing the complete intergradation.

I do not favor the habit of recent monographers in citing a great mass of specimens. Doubtless this is done to give the appearance of profundity of study, but to me it is simply cumbering one's work with a useless mass of junk. I do not mean that her work contains any junk, but its chief lack is judicial treatment. One must know ecology before being a monographer in botany.

From private conversation with the author I find that her position in recognition of species is that if the variation is a marked one it should be considered a species irrespective of field conditions. This ignores ecology and puts a premium on freaks. The great herbaria are rapidly filling up with freaks, sports, accidentally collected, that have no standing in nature. *A species ought to mean a well established group of self-perpetuating forms.* When a freak is shown to be a freak, the name should be suppressed. Cases in point are Astragalus grallator Watson, Astragalus oocalycis Jones, and Astragalus hyalinus Jones. There is much duplication of forms in the Umbelliferi because of the varying development of wings according to the time of fruiting of certain species. It should be easy to give a good description of a well established species, and this description should be based not on the characters shown by the type specimen so much as on the plant as it is known to grow.

Our nomenclature practices are at fault in many cases in the matter of priority. It is the practice to recognize the first name applied to a species, and if variations of it are found later on, those go as varieties of the earlier species. But this practice is biologically wrong, for the reason that often the first name applied to a species was given not to the plant as it grows but to a variation, good enough as a variety, but not prevalent enough to warrant using the specific name for it. An example of

this is Astragalus lentiginosus, a name applied to a very local form of a cosmopolitan species. So Astragalus diphysus, a far more representative form, must go as a variety of lentiginosus, a case where the tail wags the dog.

It was imperative that a monographer of Cymopterus should take up my animadversions on the work of Coulter and Rose and show that my criticisms were incorrect, (See Cont. 12:96 & 13:17) before accepting those spurious genera. But Miss Mathias does not even mention the fact that any criticism of those genera ever was made, though she had access to all my Contributions, and knew of all my criticisms. This is why I assume timidity on her part about going into the matter. Unless my position is disproved I see no escape from rejecting the genera. That is why I should welcome discussion of it.

BOTANISTS WHOM I HAVE KNOWN

There is a woeful lack of information about the makers of the systematic botany of today,—the collectors and the writers on western botany. It has been my good fortune to have belonged to the middle period. Pursh and Michaux were gone when I began to botanize in 1875. Nuttall was still alive, though old. He died in 1859 when I was seven years old. Torrey lived until I was twenty, but he had dropped entirely out of botanical work. Douglas was dead also, and many of the smaller lights were gone. But the great men, Gray, Nuttall, Engelmann, Boott, Eaton, Watson were still building when I began to collect. Gray, who was born in 1810 (some nine years before my father's birth), lived through all the reconstruction period of botanical research from the Linnaean system to the present genetic system, having adopted the ideas of Bentham and Hooker in their Genera Plantarum, and their method of publication. As my own life has covered a rather long period, it has seemed fitting to me to add my mite to the records of systematic botany and collectors whom I have known personally or by proxy.

The engravings of Gray, Watson, and Torrey given in this volume were copied from the Botanical Gazette and the Torrey Bulletin. This one of Gray is to be preferred to that published in the Bulletin at the time of his death, which showed him a worn old man; this one shows his steely black eyes indicative of his fighting nature. (See comments about Gray and others in Cont. 16.) The photo of Torrey, issued by the Bulletin at the time of his death, reveals the kindly nature which, like that of Sir Joseph Hooker, endeared him to all whom he knew. The photo of Watson is from the Botanical Gazette. There is also a copy of this photo at the Pomona College herbarium.

WATSON

It is noticeable that in the articles published at the deaths of the three men, there is no tribute of personal friendship in the review of

Watson's life, just a cold statement of fact, nothing like the warm personal regard shown for Torrey.

Watson's meteoric advent into botany led many to ask about his origin. The records show he graduated from Yale in 1847, and was born in 1826, some 26 years before the writer was. He was a teacher in Iowa College (now Grinnell) in 1867, and was given the M. A. degree there about the time of my Colorado explorations in 1879. The absence of evidences of personal regard shows him to have been as unsocial as I have represented him to have been. (Cont. 16:47) As a botanist, however, he stood nearly at the top. No one but Engelmann has evoked as much praise from me as Watson.

DR. GEORGE VASEY

Another man whom we all admired for his worth, but whose caliber was not that of Watson, was Dr. Vasey, botanist of the U. S. Dept. of Agriculture, whose chair Coville has rattled around in. Vasey was a real man in every way, always prompt and reliable, giving personal attention to his work. There was no man in the profession for whom I held a stronger personal regard. He was always a genial correspondent, attending promptly to the many puzzling specimens of grasses I sent to him to name. In 1882 when I sent him the grasses I got in Mexico on the trip to Ensenada with Pringle and Parry, I wrote that I considered one of the species new and would name it later on. He must have shown it to Scribner, who was trying to be a grass specialist. Almost immediately I received from Vasey a letter urging me to publish my new species at once, before Scribner should steal it from me. I replied that no honorable man would do such a thing. But he did just that and called it Melica frutescens. This was the last letter that I received from Vasey. His assistant, L. H. Dewey, who, after his death, was to take his place in charge of the grasses, was pushed aside by Scribner, who remained in charge until he was removed. (Cont. 15:30) In 1894 when I was in Washington, Dr. Rose had as his stenographer, Miss Vasey, the daughter of the doctor. She was a very social person and, at Dr. Rose's suggestion, took me over to the Corcoran Art Gallery and showed me all around.

DR. J. N. ROSE

The lovable Dr. Rose (Cont. 15:30) was no field botanist but very conscientious. It was a pity that he and Rydberg allowed Britton to dominate them and so sacrificed what leadership they might have had among American botanists. I believe they both died disappointed. Rose was not a good systematic botanist, because he had poor judgment of relationship and no ecological training or experience worth naming. Yet in the superior manner of the National Herbarium he tried to suppress me by the weight of his opinion, when he wrote that he had no sympathy with my position regarding genera in the Umbelliferae. This

was really amusing, for without adequate ecological background his opinion could have very little weight.

C. G. PRINGLE

Supplementing remarks made earlier (Cont. 16:43) about C. G. Pringle, I will state that I spent 17 days at Guadalajara in October 1930. Rev. Howland was the minister of the Congregational church there when Pringle botanized at Guadalajara. I was much surprised to learn that Pringle made Howland's place his home for eight years while he explored the great Barranca and adjoining regions. Pringle endeared himself to the Howlands, who always speak kindly of him.

Mr. Wright a neighbor of mine here in Claremont who was a missionary at Guadalajara, Mexico, when Pringle was botanizing there, and with whom he stayed at times, says that Pringle was a true Quaker in his thinking and would never carry a gun nor kill anything. On his trips he would carry some cheese and tortillas for food and be gone a week at a time. He also says that during the great Rebellion Pringle was drafted into the army. When he refused to fight, he was tied to a post by some half-witted army officer and exposed publicly as a slacker. The people in Mexico who knew Pringle are all gone now with the exception of Prof. Puga a kindly old Mexican professor of pharmaceutical chemistry, with whom I had a pleasant visit.

Pringle missed many species that grow in that region, some of them new. A person who spent eight years in a region should have got the entire flora. It has been interesting to check up on Pringle and see how many of his plants I collected in my short stay in that botanical paradise. My study of the flora of Guadalajara which I secured in 1930 has now progressed to the point where I am justified in saying that my earlier criticism of Pringle for being a poor field botanist is fully justified.

D. H. HILLMAN

One of the best botanical artists in the profesion was D. H. Hillman, professor of botany at Reno, Nev. He was another very capable man who was lost, submerged, in an unexplained way in the Dept. of Agriculture. Everyone knows of the jealousies that prevail in the departments at Washington, but no one yet has had the courage to expose the persons responsible for swamping such good men. I have a very strong suspicion as to the guilty ones. Nothing but a thorough investigation of the government departments, such as we hoped for from Theodore Roosevelt, will ever right matters. There never has been to this day a man in the presidential chair pledged to a real house-cleaning.

P. A. RYDBERG

On July 25, 1931 there occurred the second tragedy in American botany, the death of Rydberg before his time, the first tragedy having been the death of J. N. Rose. Their disappointment at the treatment ac-

corded them by the botanical public was, however, partly their own fault; for no one has a right to subordinate his own judgment to that of another, as I think they did to Britton's, for the sake of financial support.

Rydberg was a kindly Christian man, well liked by those who knew him best. He was capable, sloppy, and a mule. I say "capable" because when he really settled down to work on a thing he could do it well. I say "sloppy", because he was too much inclined (like Stanley) to rush through a thing before he had looked on all sides of it thoroughly, and so made many blunders. I say "a mule", because when he was criticised for his faults he set up his back and stuck to his errors like a mule, instead of acknowledging them and changing his course. This is particularly evident in his silly Astragaloid genera. He was almost as bad a splitter as Greene, characterizing most of his species on single specimens without taking into consideration well known ecological factors, and without attempting to collect the intergrading material in the type localities of his proposed species. He had no conception of genus, and a very poor one of species, and no conception of the effect of ecological conditions on species. How anyone could be a botanist and neglect these things is a mystery. Rydberg's first work, on Potentilla, was to me his best. He made too many species there, but the work was good in the main.

There was a time in his early years when workers in the Bronx began to swell out with what they considered justifiable pride at his wonderful insight and deep and original studies, but I punctured this bubble by showing that all his so-called original work was simply giving new names to things that were discovered and published before he was born. Since that time we have been spared any more of this bunk.

Rydberg was inclined in his later years to consider himself persecuted. I never knew that he had any personal enemies. Nor do I think any one ever got after him for personal reasons. I certainly never did, though once or twice I had some reason to feel that he had not treated me fairly in private correspondence. In one of his comments on my species, he refers to having seen my type material, in order to strengthen his comment on it, but at that time he never had seen any of my types nor ever asked to see them. Only once did he ever call on me and that was just a social call in Salt Lake City. I was always willing to let anyone look at my types but I never loaned them to anyone, for the reason that Britton had refused point blank to loan me any Astragalus material in 1895, which necessitated my taking a special trip east in 1897 to see types, at great cost to me. At that time it was a general rule not to loan types, but this has been modified since then. I still feel that it is too risky.

ON DOMINATION

I do not wish my drastic comments on Brittonianism to give the impression that I am fighting Britton. That is merely a convenient term for that type of standardization which was first put into concrete form by Britton, and used to hide his real intent, namely to dominate American botany. There never can be any real freedom, intellectual or otherwise, until men are relieved from the threatening domination of the higher-ups; this is what I have been fighting for. We see the sinister results of this spirit in the somersault of L. R. Abrams in his second edition of the Flora of Los Angeles. It is also evident in the monographs put out by students working for their M. A. and Ph. D. degrees. These monographs too often represent not the opinions of their ostensible authors, but those of the professors under whom the students worked. I have often asked such persons why they do not take an independent stand and express up-to date ideas. Their reply is always the same: "I would not get the credits I am working for if I antagonized the professor." So everywhere we find servility to the detriment of scientific research. This I consider the most vicious tendency of today. J. N. Rose told me in 1895 that he considered it more important to have a chance to work than to stick for any special form of nomenclature. This was when the fight was on against the beginnings of Brittonianism. So as the years went by, he became more and more a slave, till he lost all sense of proportion, and his critical judgment was impaired.

The only objection to my criticism of the botanical dictators which I have received (I received many grateful expressions of approval) came from a woman who did not like me to write "mean things". I should be duly squelched, but, like the Irishman's turtle that still wiggled its tail after its head was cut off, I am "dead but not sinsible of it". I do not wish to be spiteful at all, but I do approve of frankness, honest criticism, and independence. I have chosen to attack the dictators by ridicule because they are impervious to argument. When people make so much fuss about priority as they have made, and then deliberately adopt "once a synonym always a synonym", and brazenly relegate to oblivion all the names of families like Coniferae, Leguminosae, and Compositae because they are not founded on genus, nothing but ridicule will get under their elephantine hides.

FREEDOM AT POMONA

Such domineering intolerance in scientific work is not necessary at all. Here at Pomona College, where Dr. P. A. Munz is head of the botany department, the scientific branch centering in Crookshank Hall forms a kind of patriarchial family, in which we cultivate individuality and the growth and development of personality, and frown on the subterfuges of society such as false dignity, etc. There is a sort of free masonry that is very enjoyable. The girls especially are addicted to do-

ing their own thinking and expressing their opinions, which are genuine even if not always complimentary to the older heads. I have had enough experience as a teacher to know that any attempt to dominate people is fatal to progress. It is not quantity but quality of work that counts. To be sure, there is much waste in getting quality, but there is waste in all progress,— the scrapping of the effete. Probably this is the reason for the death of the aged. We get too hide-bound by our traditions and environment.

THE YOUNGER BOTANISTS

It has been my pleasure to meet in recent years many of the younger generation who are coming along slowly picking their way to efficiency in the school of hard knocks. Among them are Johnston of Harvard, a former Pomona man, Prof. Cory of Texas, Prof. Cottam of Utah, Miss Mathias of the Missouri Botanical Garden, and others. I have also found much pleasure in association with the members of the Los Angeles Nature Study Club, and with members of the Cactus Society which issues Desert, one of the best publications on succulents. In fact, I have been amazed at the number of capable women in southern California who are doing botanical work. So, in spite of the recent eruption in systematic botany, there is much hope for the future. There are many younger botanists coming along, with some of whom I have worked on intimate terms in the last few years, whose places are yet to be made. Among them are Vesta Newsom, Martha Hilend, Elizabeth Crow, Helen Sweet, Tom Craig and Ray Fosberg.

If I were trying to be giving a fair estimate of the botanical work done during my time, I should have to go into the work of Trelease, Miss Alice Eastwood, Piper, Thornber, Conrad, Nelson, Rydberg, Payson, Pennell, Munz, Johnston, Hillman, Dewey, Holm, Elrod, Setchell, and possibly others, — work which I shall never be able to do.

DR. WILLIAM A. SETCHELL

[Inasmuch as Prof. Jones had had a cut made of Dr. Setchell to put into Cont. 18, it is evident that he intended to write something about him. I can find nothing, however, except remarks made in personal letters to me. When, in 1932, Father was in Berkeley at the University Herbarium for many weeks working on the identification of his Mexican plants, Dr. Setchell persuaded him to stay several weeks longer in order to dictate to a secretary furnished by Dr. Setchell the story of his life, especially of his scientific work. He had promised to write it out himself long before but never seemed to get around to it. Mrs. H. P. Bracelin laboriously took down in long hand his rather scattering reminiscences. Father thought a great deal of Dr. Setchell, often speaking of him as "a prince of a fellow" and a fine botanist, — superlative praise from him. — M. J. B.]

HOW I BECAME A BOTANIST

I have often wondered why we do not know more of the early days of the older botanists. So far as I know, there is hardly a word said about what led men to become botanists, or naturalists. I have even asked older men to tell us of their earlier days. What a fund of interest could be unearthed as to incentives, early influences. But these men will seldom talk or reveal anything, perhaps from modesty or because they cannot imagine that anyone else would be interested or helped. How I should like to know why Torrey, Nuttall, Pursh, Gray, Engelmann, Watson, Brandegee became botanists ! When I urged Mrs. Brandegee to write about her life work, she turned to me in disgust and blurted out almost savagely, "What does the world care for me ?" The world cares much more for us than we care for it.

In my own case, I feel that I can trace the events and influences that led me to be a botanist.

First and foremost, I had an angel mother. I flatter myself that there never was another like her. She was a little, frail woman, but pure gold; never quarreled, never fretted, always an optimist. She lived for us seven boys and my sister. Her ideals were high. In the first place, moral cleanliness was our obligation to God. Futhermore life was a magnificent opportunity as well as an obligation to utilize all our powers, mental and physical, for the benefit of the world, and not for personal gain. And also to her all the wonderful adaptations and machinery of plant and animal structures were illustrations of the infinite care of the Creator for his creatures. She loved flowers and always had on the mantle a fresh bouquet that she had encouraged us to gather for her.

When we were very little she told us of the funny Dutchman's breeches (Cucullaria), the squirrel corn (Dentaria), the bloodroot with red sap (Sanguinaria), the ground nut, good to eat, (Erigenia), the squawberry with the little red berries hidden under the snow, the trailing arbutus, (Epigaea), the beths (Trillium) the moccasin and lady's slipper (Cypripedium), the golden rod of the fall season, the gentians, and the asters. All these she pointed out and named for us as they bloomed. She was always delighted to have us bring her freaks of nature, odd and unexpected forms. One day we boys came across some tree roots that had crossed and grown together. None of us had ever seen such a thing before. So she told us to show it to Mr. Olds, the minister. This is one of my earliest remembered introductions to nature study.

My father owned a sawmill and taught me all about lumber,— how to tell the different kinds of oak, hickory, ash, maple, and birch. He was a fine woodsman and a great lover of animals. On nutting expeditions and at "sugaring-off" parties in the maple woods I absorbed much of his knowledge and love of the out-of-doors.

For the sake of better influences for their large family, Father and

Mother decided to sell the old mill and move to Iowa some five miles east of Grinnell on the pristine prairie; and here I grew up from my early teens on the wonderful prairie. Everywhere were flowers in the spring and summer time, all of them strange except those growing in the natural grove a mile east of us. The niggerheads (Heliopsis and Eryngium) we used to flip off with our whips as we drove along. There were sunflowers, rattlesnake weeds with prickly heads (Eryngium), the compass plant (Silphium) whose leaves pointed north and south, the blazing button rods (Liatris) of different kinds. In the sloughs (wet places) we used to find many asters and gentians. Then there was the prairie apple (Astragalus crassicarpus), and in the thickets the lady's slipper (Cypripedium), Habenaria, Spiranthes, etc.

To get an education was part of Mother's religion; so, of course, I went to college, walking five miles back and forth. In the worst weather I boarded myself in town. Grinnell was a small college with half a dozen devoted professors, mostly ministers. Some of them were great men (such as Dr. Magoun and Prof. Macy), but none of them looked upon science as anything but an educational freak. Education meant proficiency in literature, languages, and religion. I became proficient in Latin and Greek and studied Sanskrit. I also knew some French and German. All this time my recreation was with wild flowers. My mother was always spurring me on to know more about them. I never thought it any work to study flowers; it was just a part of my life. There was no one else at college who knew as much about them as I.

The only botany text-book I knew was written by Mrs. Lincoln, who used the system of Linnaeus and who tried to describe the flowers of the middle United States. The descriptions were brief and inadequate, and the genera were arranged not in families but in the order of their stamens and pistils. Everywhere were such names as Syngynesia, pentandra, tetrandria, polyandria, etc. For some years, with the help of my mother, I tried to identify plants by Mrs. Lincoln's Botany.

In my senior year in college I used Gray's Manual of Botany and his Lessons in Botany. Our Professor of Natural Science, H. W. Parker, was a scholarly minister, devoted to building up a great museum at the college, but botany was of little interest to him. Our teacher was the Lady Principal, Miss Ellis, an old maid who had traveled in the Holy Land, had been to Rome, and had brought home a few scraps of plants clutched as she went along past old ruins. I remember her giving me a specimen of Asplenium ruta-muraria from the Colosseum. She was a lover of flowers but had no training in botany and never did really identify a dozen plants by analysis. So it was up to each student to get the names the best way he could. There was always a conflict of authority as to what was the real name for a plant.

Thomas T. Baker and A. O. Hart, who had graduated the year before me, were really trying to name our Iowa flowers. Both of them had considerable skill, and were very helpful to us when Miss Ellis got

beyond her depth. After my graduation, I was so exhausted from over work and undernourishment, that it was not long before I fell a victim to a slow fever that incapacitated me for work and left me a perambulating wreck. To keep my mind occupied I rambled over the hills and prairies, collecting plants and trying to name them. That fall I had 625 species.

During the following year of post-graduate study at the college, where I was also a Latin tutor on the faculty, I met J. C. Arthur, a protege of Bessey at Ames, who visited Grinnell to find out if any of us were doing botanical work. The acquaintance begun then lasted all through the years. A year later he published a list of Iowa plants, both native and introduced, and among them he mentioned a few which I alone had found.

About that time I began to correspond with Dr. Engelmann of St. Louis, who named many plants for me. Then, at his suggestion, I wrote to Gray, Watson, Wm. Boot, and others to aid me in naming our plants. Gray was efficient, careful, and genial. Watson was as business-like as a phonograph and about as cordial. Boot was right there with all his names and a pleasant correspondent. Engelmann was very efficient and genial. I found something especially attractive in the personality of Pringle, just as I did later in that of Dr. Kellogg, Cusick, Mrs. Brandegee, and Mrs. Austin.

About that time an Austrian gentleman in Europe wanted me to gather the flora of the Great West and send him sets to sell. My disgust at the thought of spending my life teaching Latin, and my poor health, which demanded an out-door life, conspired to suggest my becoming a real botanist. More and more the idea obsessed me, until I decided to take my life in my hands and go to the wild and woolly West.

MODERN AND EARLY BOTANIZING

Botanists of today wonder how men did their work in the early days. Insufficient funds and the conditions of travel were great handicaps to the collector. One could never carry enough materials or equipment to make fine specimens. The Lewis and Clark expedition had to use canoes made by hollowing out logs with axes. There was much danger in going through rapids and always the risk of having everything splashed with water. When not boating they had to carry their loads on their backs at the portages. In those days they did not even have old magazines to use for a temporary press, as the modern woman traveler does. About the only paper available was the rough brown wrapping paper that we used to call butcher paper, which was of about the consistency of the coarse modern paper towels. This paper was about three feet wide and was folded four-double to about the size of an ordinary magazine and tied up in packs. Then the botanist gathered snips like the modern school girl's, slipping them into the pack as he had

a chance and leaving them tied up till they either dried or molded and rotted. The necessity for drying them properly was not even considered. Whether Nuttall ever made any decent specimens I do not know. All of his that I have seen showed the inadequacy of his equipment, for they were blackened in the drying and almost worthless. But they are all that are left of his many types. They have been mounted and arranged by Thomas Meehan. I was able to examine his Astragalus material in 1897.

No doubt Freemont's trips across the continent were made on horseback and with limited space for specimens. This was in the early forties. Practically all the types taken on Government surveys were collected in the same way. Wagon roads were not available in those days, for buffalo trails were the only roads.

My own experience with making specimens began in the early seventies, some thirty years after Nuttall's time, when wagon roads had been made by emigrants all over the west, and when transcontinental railroads had just been built.

When I began to get ready for my first trip to Colorado, I had the benefit of advice from all the old ladies and old men who never had made any such trip. I was told to wear the heavy cowhide shoes that the soldiers of the Rebellion wore in the war and to have the soles filled with hobnails to enable me to climb the mountains. Also following their advice, I took tissue paper to put my specimens in but found it a nuisance . For driers I bought butcher paper and folded it in about four layers to make driers a foot wide and a foot and a half long, sewing the layers together around the edges. At that time some wise guy in the east had evolved a theoretical drier out of felt cut to the regular size and one quarter inch thick, and sold them at a reasonable price, which was, however, altogether out of my reach. Then another wise guy had evolved a wire press with clips on the corners and wire chains to tighten up as the specimens permitted. The top and bottom of the press were made of band iron riveted together at the corners and with wire laced through holes punched along the sides. This press I used as a portfolio to carry with me in the field. For a press I used boards, tying them up with ropes. When in camp I put a heavy board and a stone on top to keep it tight. This was my equipment in 1878.

Since I walked about 15 miles a day botanizing, my cowhide shoes became a nuisance, although they stood the wear and tear of walking all right, and lasted me all summer. The exertion of lifting them at each step took so much energy that I was tired out every night, but, being young, I did not realize what was the matter. When the weather was wet or cold they were very uncomfortable. In the Death Valley region I wore my old cowhide shoes one year but found that the hobnails fell out of the blackened holes in the leather as though burned out. The heat of the ground was such that in walking from Ballarat to the Panamint Mountains one day I actually had to sit down on the ground and hold my feet up while the soles cooled off.

It was Nuttall's habit to tear off a little piece of paper and put it in with the specimen showing the locality and date. I used this method in the first year of my botanizing but discarded it for specimen books in which I placed a fragment of the plant together with all data written in pencil and the specimen sheet number. These books I made of sheets of specimen paper folded double with edges cut and holes punched in the folds through which I passed strings to tie up about 400 pages together. I covered each book with oilcloth. This was my method when I was making sets for distribution. If my memory failed me, I could look up the number to determine the data for each specimen. In later years when I was not making sets, I wrote the data on each sheet separately to avoid errors. I do not favor carrying note-books with numbers for each specimen gathered, for it takes too much time and work in the field, and the less field work the better.

In my work in the Grand Canyon for the Government in 1894, I was instructed by Coville to use the note-book method, but I disregarded it for my own way, and when I got to Washington I had a row with him about it. In one discussion with me he snapped out, "You and Greene are the two most conceited men I ever saw!" I did not reply to this, but wanted to ask, "How about the man you see in your mirror?" I had had about twenty times as much field experience as he, and did not care to adopt a method already proved inferior in the field. There is too much danger of losing your note-book in the field (as I did once in Mexico) and being left completely at sea, all your work worthless without your data.

When tennis shoes came into vogue, I found that their lightness was a great advantage, so used them altogether. A heavy-soled pair will last six weeks, cost less than half as much as leather shoes and weigh only a fourth as much. They are unsurpassed for climbing rocks and are undesirable only in rock slides or swamps.

A I began to use my reason in the light of my own experience, I discarded a lot of foolish equipment and evolved what was usable and inexpensive. In place of a trowel or butcher knife to dig up plants, I had a blacksmith make me a light pick with one end made into a blade one and a half inches wide, each end being only six inches long. Into this I inserted a small pick handle three feet long, so that I could reverse it and use it for a cane in climbing. I had early learned that to make good specimens I must dig up the whole plant, fold it skillfully to fit the sheets and still look life-like. With this pick I could easily get any ordinary plant with one blow, or I could use it to kill snakes, if I saw any.

In the eighties when I was botanizing in Arizona, I had the old time driers and often had two piles of drying plants four feet high. To change these, spreading wet driers out in the sun and putting in new ones, took four hours of the most strenuous work, sitting in the hot sun at noon and shifting the sheets from one place to another, although it

took but a few minutes for the driers to dry in the baking sun. It had to be done daily to prevent specimens from moulding or turning black.

For driers we now use double-faced corrugated cardboard cut into sheets 12 by 18 inches. When tightly strapped down, they seldom need changing in the usual weather of the deserts, if the bundles are kept out in the sun and wind. I have gone for weeks without changing these driers. It is best to keep fleshy plants (such as succulents) in a spearate press with extra driers and for frequent changing. I usually take along 300-400 driers for a trip. When the weather is wet there is nothing to do but change driers even if they have to be dried over a fire, which is a long and tiresome job. But in all my botanizing I have had to dry my driers over a fire only three times.

I found that any rigid press lets the edges wrinkle in drying, while the center gets too much pressure. I make the finest press imaginable as follows: I buy No. 14 tar-board (now called binder-board) from a book-binder, have it cut 12 by 18 inches and cover it with oilcloth cut 4 to 8 inches wider all around. I cover the cloth side with Le Page's Glue, lay a tar-board in the center of the cloth, pressing it down tight and folding the edges of the oilcloth over (corners cut out) on the back of the tar-board. I keep them under pressure until dry. I take 4 to 6 of these heavy covers along for presses and I use straps made of sole-leather cut six feet long and two inches wide with holes punched two inches apart and with a heavy buckle on one end. A bundle of driers with a tar-board cover on each side and one of these straps around each end of the bundle makes a good press. I sit or kneel on the bundles and pull up the straps tight *daily*. For several years I carried a collecting-can with a tight lid, but now I use two of the prepared tar-board covers for a portfolio to carry along in a shawl-strap with plenty of paper sheets to put specimens in. For specimen paper I buy unprinted newspaper cut 23 by 18 and folded in quires to fit the driers. I take along 2 to 6 quires for a trip and strap them up in the portfolio without driers. As soon as I get any plants, I sit down on the ground, open my portfolio, take out a sheet and write on the lower left hand corner the date, locality, and any other notes about color or flowers, etc. Then I lay the specimens on the right half of the open sheet, arranging them so that they do not touch each other. Then I fold the left half over the specimen, and lay a fresh sheet on top, continuing until all are in. If specimens are put in fresh, the flowers and leaves usually lie flat and lifelike, with only the occasional special arrangement of a leaf. I pile the empty quires of paper on the filled sheets, strap up my portfolio, and trot along for another picking.

When I get all the plants for that trip and go back to camp or home, I transfer all filled sheets to the press *without opening the sheets,* placing a drier over each sheet. I never open the sheets till dry for fear of crumpling delicate parts. Usually plants will dry in three days to a week. When dry, the sheets will feel warm to the touch, not cold. Then they can be taken out of the press, stacked in a pile and strapped up in an

empty press. But be sure the stems are dry. If not, put the few damp sheets, tied up tight, out in the sun for an hour or so.

My sixty years of experience have taught me that to do the best botanizing, you must travel light, with the least possible toggery. So I take a first-class post-card camera, a strong tripod, a color screen, a fine field-glass, a barometer, a pick with long handle, a pocket folding Coddington lens, a heavy pair of overalls with plenty of pockets, a wool shirt, a cork hat, heavy socks, and tennis shoes, and I let the dudes have the rest. If it is very dry and the foot-trip long, I carry a small canteen.

Don't let anyone fool you by saying that any one way is the only way of doing things. Use your own horse-sense. If you can make good specimens standing on your head or dragging heavy boots, then do that. Results are what count. I find it best to do my routine work with the least possible effort, saving my energies for more important things, and so at over 80 years of age I am still climbing the mountains with the young folks.

MARCUS E. JONES, A. M.

BIOGRAPHICAL SKETCH

Marcus E. Jones, always called Prof. Jones by his friends and acquaintances (because of his many, though intermittent years of teaching), was born in Jefferson, Ashtabula County, Ohio, Apr. 25, 1852, of old Yankee stock, his ancestors having come to America on one of the later trips of the Mayflower. His mother was Lavinia Burton, a sister of the late U. S. Senator Theodore E. Burton of Cleveland, Ohio. His father was Publius Virgilius Jones, a lumberman and a local captain of militia. His grandfather, Judge Lynds Jones, had been a pioneer in Ohio; his father pioneered in Iowa (when Prof. Jones was a little boy, his family were moving west on the very day that Lincoln was shot); Prof. Jones himself went, in young manhood, to the frontiers of Colorado and Utah and the far west, and his last few years found him still "roughing it", exploring Lower California. Some of his botanical friends speak of him as the last of the great pioneer, exploring botanists.

In spite of poverty and hardships, Marcus Jones graduated from Iowa College (established 1843; now Grinnell College), with the degree of Bachelor of Arts in 1875. After three years of post-graduate work while teaching Latin and Mathematics, he received his M. A. degree with high honors in 1878. He had previously won medals and prizes for fine scholarship, and years later, when a Phi Beta Kappa chapter was organized at Grinnell, he was elected to membership and awarded a key, which he wore with much pride. He had received an unusually thorough classical training in Latin, Greek, Sanskrit, and Anglo Saxon as well as being familiar with German and Italian. And yet he was not a natural linguist and found that he detested teaching Latin, although he proved to be a very successful teacher. Science was his hobby and exploring his joy. But practically all training in these things he gained for himself after college days were over.

He spent the entire summer of 1878 exploring the mountains of Colorado and collecting 1100 different kinds of plants, which he studied and named the following winter with the help of his correspondents, Vasey, Gray, Watson, Morong, Boott, and Englemann. He also taught Botany in his home college part of the time.

The next year he substituted for the regular professor of Natural Sciences at Colorado College and there received the title of "Professor" which clung to him all his life. Here began a life-long friendship with Gen'l Wm. J. Palmer, Pres. of the Rio Grande R. R., who later employed Prof. Jones for 20 or 30 years as his personal explorer and geologist, and who financed a number of his publications. It was about this time that Prof. Jones discovered that he was very near-sighted, and for the first time donned glasses, which "revealed a new world" to him, as he said. During the following summer and fall Prof. Jones botanized in

Utah, returning to Iowa to prepare his sets of plants for shipping to Europe. There, Feb. 18, 1880, he married a former college-mate and pupil, a very beautiful girl, Anna Elizabeth Richardson, also a Phi Beta Kappa scholar and at that time Acting Dean of Women. Together they set out at once for Salt Lake City, where they spent the rest of their married life. Mrs. Jones was much interested in botany as well as being very artistic. She accompanied him on some very difficult trips and helped him make many souvenir booklets of wild flowers, which they sold.

For one year Prof. Jones taught in Salt Lake Academy, one of the two "Gentile" high schools there, and from 1881 for eight or nine years he and Mrs. Jones conducted a private high school and kindergarten for non-Mormon children. Mrs. Jones was a remarkable teacher, and frequently, even in later life was persuaded to do tutoring.

During these early years Prof. Jones made many long botanical trips through California, Nevada, Colorado, Arizona, and Utah, and even as far as El Paso, publishing his findings in the Torrey Bulletin until they refused to publish any more unless first submitted to Asa Gray for his approval. As Prof. Jones felt that he knew the western flora better than Gray, he refused to do this and ceased publishing for some years, later sending his articles to Zoe until he decided to publish them himself. He continued to send sets of plants to Karl von Keck in Austria for European distribution and received 20,000 European specimens in return. It was von Keck who had Prof. Jones' "Excursion Botanique" published in Liege, Belgium, by E. Morren about 1879 or 1881.

In 1889, Prof. Jones was engaged by the president of the University of Utah (then practically all Mormon) to organize the university library and install the Dewey system.

In 1890 he was engaged by Gen. Palmer to explore Arizona and report on the feasibility of a railroad route from Tucson to Salt Lake City. This trip was made by team and horseback at about 30 miles a day in temperatures around 125 degrees, but Arizona was a garden of flowers and yielded many valuable specimens for his herbarium.

The next spring, 1891, he conducted for Gen. Palmer an exploring party west across the desert to Cherry Creek, Nevada, from Tintic, a big mining camp west of Goshen, Utah. He explored and sampled all the mining prospects (botanizing as he went) around Omega Mts., Dugway, Fish Springs, Ibapah, Deep Creek Mts., Dutch Mts., Gold Hill, Clifton, Gencoe, Aurum, Shell Creek Mts., Sprucemont, and Antelope Spring. That winter he set up a complete laboratory for assaying, and employed two expert chemists, E. P. Austin, who was also the creator and owner of "Psyche", the leading entomological journal in North America, and Victor C. Heikes, who later became the head of the U. S. Geological Survey in Salt Lake City.

In the spring of 1892 Gen. Palmer telegraphed him to go to Mexico to examine the Sierra Majada, Zacatecas, Guanahuato region and the

properties along the Mexican National R. R. from Irapuato to Manzanillo. He received every courtesy from the ranch and mine superintendents and botanized wherever possible without delaying the party too much. By train, stage-coach, and burros he went from Mexico City to Colima, past its active volcano and even to some mines in the jungle. He collected 782 numbers on that trip, including 40 or 50 new species.

In 1893 he explored Nevada again, owning and operating a mine until the disastrous drop in silver that year. In 1894 he was appointed field agent of the U. S. Gov't to explore the Grand Canyon of the Colorado. He spent the following winter in Washington, D. C. labelling and identifying the 4400 plants collected. As usual, he did not charge enough for his services. The salary he received did not cover half of his expenses. The report of this work is in his Cont. No. 7.

For the next few years all his time was spent on his monograph Astragalus except for mining and business trips necessary to earn a living. One trip was made to San Francisco, followed by much botanizing up and down eastern California and up into Oregon. In 1897 he also went to Philadelphia to photograph the types of Nuttall's Astragalus and on to Harvard and Columbia for more photographs.

An appointment as geologist for the Pacific and Idaho Northern R. R. in 1899 enabled him to explore that part of the country, and later in the year he was made Special Statistical Agent of the Dept. of the Interior to publish a book on Utah. For many years he was State Geologist of Utah, keeping an accurate record of the water level of Great Salt Lake, as well as many charts of the water-level of various irrigation districts.

When the first case of smelter smoke damage, the Evans case, was tried in Utah, Prof. Jones was put in charge of the expert work. The smelters had so much power that no local decision was rendered, but the case was won against the smelter when carried to the U. S. Supreme Court, and the smelter was closed, dismantled, and sold at a great loss. Prof. Jones who had gained quite a reputation as a mining expert and had been employed to examine and assay many properties, used to say that his responsibility in the Evans case caused him to be boycotted by the mining interests for several years. But he never consulted his own interests when it was a matter of right or duty.

Before long the Mormon farmers, realizing that he was fearless and incorruptible, beseiged him to fight their damage cases, and he "was swamped with business until 1910". He fitted up a chemical laboratory in the basement of his house, made a thorough study of modern chemistry by himself, collected and analyzed his own specimens of injured animals and vegetation and then served for weeks at a time as expert witness at the trials. He gloried in a battle of wits, especially when championing a just cause ; so he was in his element on the witness stand But he was nearly 60 years old, and found the nervous strain "terrific". It pleased him greatly to win his cases even though the opposing expert for the smelters was a university professor of chemistry. The smelters

were forced to install the "bag house" to solve the problem of smoke damage.

He spent two and a half years as botanical expert in Montana in the great suit against the Anaconda Copper Company of Butte for smelter smoke damages. Among his effects were found many scrap books of photographs taken as evidence in this case. While botanizing throughout Montana, he became a personal friend of Prof. Elrod of Montana University at Missoula and was invited to teach botany and geography at the summer school at Flathead Lake. For three years he spent six weeks there during July and August botanizing all over that country, including Glacier National Park. The results, "Montana Botany Notes", were published by the university. At Prof. Elrod's request he devoted a year to writing up the Flora of Glacier National Park, illustrating it fully with photographs; but the university regents finally refused to publish it on account of Prof. Jones' opposition to the Anaconda Copper Co., which controlled everything in Montana. In some of his autobiographical notes, Prof. Jones says that Prof. Elrod offered to have the university honor him with a Ph. D. if he would establish residence at the university for at least a month, "but I told him it wasn't worth the time."

As a relief from severe mental application on scientific problems while in Salt Lake City, he played chess and checkers and filled many notebooks with intricate analyses of all the known plays and leads in checkers. All of this manuscript together with his rather complete library of information on the game is in the Pomona College library. One of his checker "cronies", Junius Smith, a Salt Lake attorney and former state checker champion of Utah, wrote of him: "J. C. Harrop told me that your father was the one man he knew could beat him. Harrop is the Ogden Utah, expert, and is one of the finest players in America . . . Harrop and I were fully cognizant of your father's playing ability when he really put his mind to it . . . As a rapid player, I never saw his equal. In match contests, however, . . . the strain was greater than he cared to undergo, and he seldom did so. But I have seen him do it, and he has won games from me when I was in top form."

Probably it was his intense intellectual curiosity and pride that led him to say often, "What *has* been done, *I* can do." He liked to prove to himself that he could do any difficult thing as well as a specialist in that field; but he did not have a high enough regard for the great perfection of technique necessary for ultimate success.

It is impossible in this brief sketch to mention all the botanical trips, several each year, which Prof. Jones made, from British Columbia to South of Mexico City. He planned as his life-work to publish a "Flora of the Great Plateau". At Pomona College are stored his many Notebooks bulging with manuscript; but ill health, field trips, insufficient funds when he had the health, and other interests prevented his completing the revision of more than two thirds of it.

In September, 1916, Mrs. Jones died, after sixteen years of strenu-

ous effort to carry enough of the family financial burden to enable Prof. Jones to finish his life-work. All three children had graduated from college and were either married or teaching. Prof. Jones had only himself to support but was faced with the problem of housing safely his vast herbarium during his long absences. For a while it was stored at the University of Utah.

By 1920 the manuscript of his revision of Astragalus was practically finished, but he was financially unable to publish it until 1923, when he sold his huge herbarium to Pomona College. During the preceding years of anxiety he had tried many ways of earning money. He wrote many short articles on interesting experiences he had had and sold some to various magazines. He could probably have sold more if he had not been too proud to enlist the criticism and revision of some one skilled in English composition. His writing showed much originality and pungent expression but it was carelessly constructed and poorly organized. He also enlarged and colored by hand some of his choicest photographic views and sold many of them. But extravagance in taking pictures and carelessness of finish prevented that from being a very successful venture. He certainly spent many thousands of dollars in his lifetime on cameras, slides, color-photography, enlargements, etc. He even experimented with zinc etching. At his death he had hundreds of plates taken 30 or 40 years ago, of beautiful scenery, plants, geological formations, mines, and people. Many that were of especial scientific interest were left at Pomona College. Others are at Stockton awaiting suitable disposal. Anyone having good use for them should make it known before they have to be destroyed.

When not on field trips, Prof. Jones "kept fit" by tennis-playing and ice-skating, at both of which he was quite an expert. The tennis he kept up in a little club of men at Pomona until he was 80 years old. At Pomona he also took great pleasure in the informal meetings of the Afternoon Club, made up mostly of brilliant and interesting men who had retired from their former activities. He greatly enjoyed various Nature Clubs, especially the S. B. Parish Botanical Society, often traveling a hundred miles or more in order not to miss one of their trips. On one of them his last day was spent.

In 1925, when he was 73 years old, he returned alone to Grinnell, Iowa, in his old 1916 Ford to his 50th class reunion, where he met one or two of his old classmates and was honored by being made honorary marshall of the alumni parade. It was amusing and perhaps regrettable that his scale of values placed personal appearance in the category of non-essentials. His face was so interesting, his eyes so keen and sparkling, and his conversation so entertaining and instructive, that his friends always made allowances for the rest. He seemed oblivious to any possible annoyance caused by his carelessness.

During his last eleven years a comfortable income enabled him to take many trips all over the western states and to publish his own Con-

tributions in which he said whatever he liked. Several times he accompanied to Little Zion and Bryce Canyons the ecological summer classes of his brother, Dr. Lynds Jones of Oberlin College. And finally, when about 80 years old, he made several difficult trips into Lower California.

With characteristic improvidence he spent much more on his old Ford than a new one would have cost, and was constantly being held up for days for repairs and having to be towed back from reckless attempts to defy floods, impassable roads and bad weather. But he enjoyed it all and continued to the end an undaunted camper and explorer, an indefatigable worker and investigator. His memory was prodigious and his versatility amazing.

In criticism of other scientists he was usually sharp and caustic, although he did not himself take criticism very well nor tolerate difference of opinion. But to the amateur botanists, especially those who worshipped at the shrine of his truly vast fund of knowledge and experience, he was gentle and kind, generous, patient, and always helpful. He had made a very thorough study of the geologic history of the West, and probably no living botanist had nearly so great ecological knowledge as he.

Until nearly 70 years of age Prof. Jones was a fundamentalist in religion, always active in church life, teaching classes, superintending mission Sunday-schools, and for years acting as supply preacher in various non-Mormon churches in Utah. But in his later years deafness made him cease attending church, disappointment with the unworthy character of several ministers led him to distrust their leadership, and a thorough overhauling of his old theological beliefs in the light of his scientific knowledge led him to discard most of them and to repudiate the church as an institution which had strayed from the purpose and spirit of Christ; but he always retained his faith in God and his implicit belief in prayer.

It is doubtful whether Prof. Jones could have completed the revision and publication of his Flora of the Great Plateau if he had lived. Leisure and relief from financial handicap came too late for him to be able to stand the grilling strain of the work. And it is also doubtful whether there is any other living botanist familiar enough with the territory covered to complete it. It would probably require at least five years of the time of a qualified botanist, to say nothing of the expense. Much of the Great West which the manuscript and specimens represent is built up into cities now and gone forever as a botanist's paradise. But Dr. P. A. Munz is taking excellent care of this priceless store of source material at Pomona College in Claremont, California, where it is available for research. — M. J. B.

EPITAPH UNIVERSAL
FOR BABE OR PATRIARCH
"STRICKEN DOWN ERE ITS WORK WAS DONE"

Out of the dusk and out of the dawn,
Ever and ever the rune runs on.
Early or late be the task begun,
None survives till his work is done.

Epitaph of humanity,
Whispered and carved while the race shall be,
Blazoned on fire by the last low sun:
Stricken down ere its work was done.

EOLUS.

PRESERVATION REVIEW
Aug
2006

UNIVERSITY OF ILLINOIS-URBANA
3 0112 077455290